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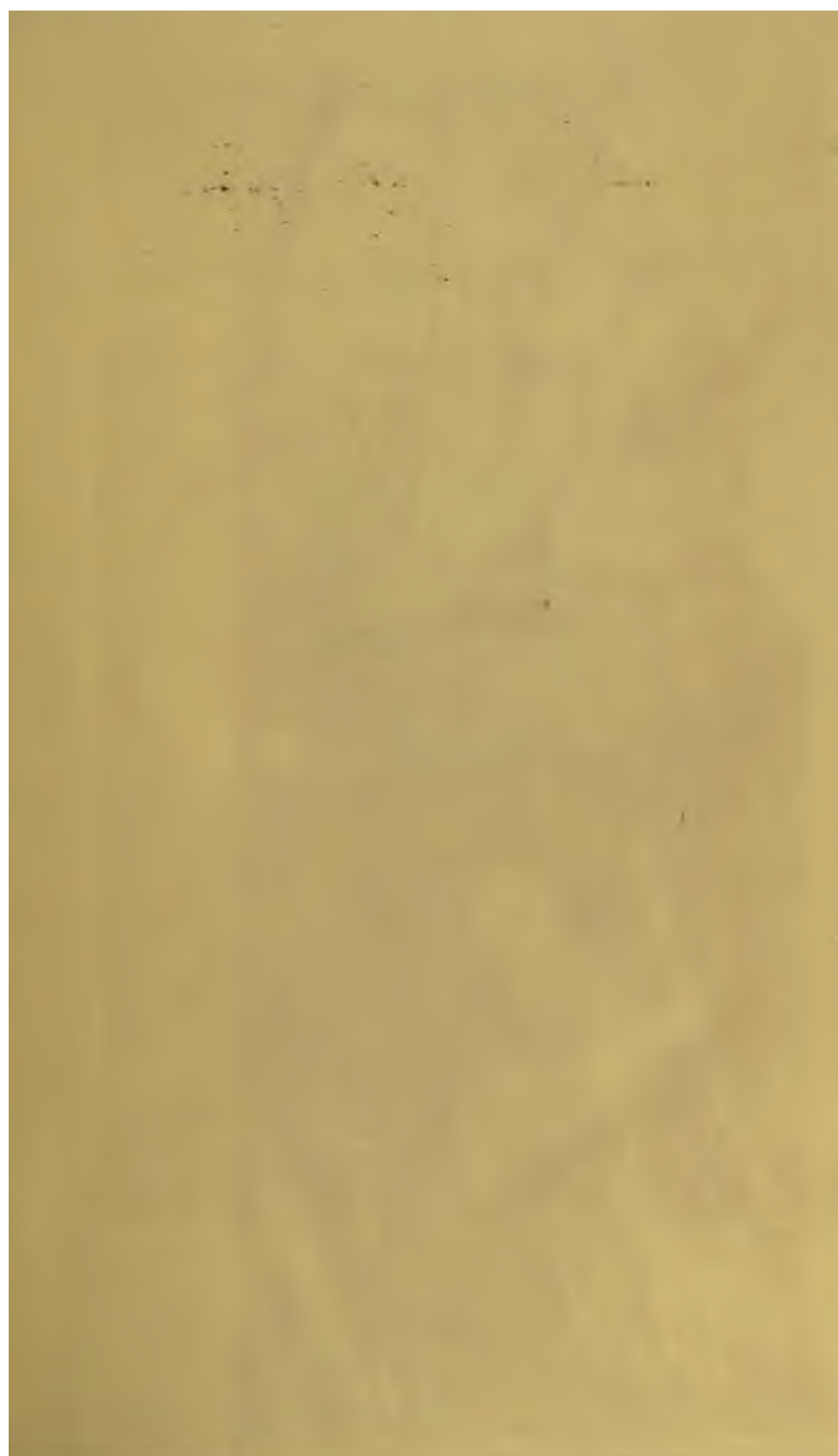


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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.



VOL. V.
SESSION 1860-61.
Nos. I. to V.

EDITED BY FRANCIS GALTON,
HONORARY SECRETARY.

Authors are alone responsible for the contents of their respective statements.

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ELECTED 27TH MAY, 1861.

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PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.

SESSION 1860-61.

First Meeting, Monday, November 12th, 1860.

LORD ASHBURTON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Dr. Thomas Fox ; Dr. A. D. White ; T. Longridge Gooch ; R. Biddulph Martin ; J. Septimus Roe ; and Thomas Wilson, Esqrs., were presented upon their election.*

ELECTIONS.—*Captain J. Grantham, R.E. ; Robert Lush, Q.C. ; James Alfred Lockwood, and Henry Cartwright, Esqrs., were elected Fellows.*

ACCESSIONS.—The accessions to the Library and Map-rooms since the former meeting were numerous. Among the more important were the following:—United States Reports of Explorations and Surveys; Geology of Iowa, 2 vols.; 2nd and 3rd Reports of the Geological Survey of Kentucky, by D. D. Owen; Marco Polo, edition by W. Marsden; Leake's 'Numismata Hellenica' and 'Coins of Syracuse,' presented by Mrs. Leake; Raleigh's 'History of the World;' Ouseley's 'Travels in the East;' Thornton's 'British India;' Erman's 'Siberia;' Tennent's 'Ceylon;' Bowring's 'Philippine Islands;' Brown's 'Sequel to the N. W. Passage;' Swart's 'Journal van Tasman's Reis,' and map; Black's, Blackie's, the Dispatch, Keith Johnston's, and Van Carnbée's Atlases; sheets of the Government Map of Saxony; of the U.S. Map of Nebraska and Dakota; Maps of Otago, by J. T. Thomson, &c. &c.

ANNOUNCEMENT.—The Chairman said that a letter would be read from Captain Burton, as it would be a matter of pleasure to all present to know that this excellent, bold traveller was in good health. The following characteristic letter from that distinguished traveller was then read:—

Salt Lake City, Deseret, Utah Territory,
Sept. 7, 1860.

MY DEAR SHAW,—You'll see my whereabouts by the envelope. I reached this place about a week ago, and am living in the odour

of sanctity—a pretty strong one it is, too!—prophets, apostles, *et hoc genus omne*. In about another week I expect to start for Carson Valley and San Francisco. The road is full of Indians and other soundrely, but I've had my hair cropped so short that my scalp is not worth having. I hope to be in San Francisco in October, and in England somewhere in November next. Can you put my whereabouts in some paper or other, and thus save me the bother of writing to all my friends? Mind, I'm travelling for my health, which has suffered in Africa, enjoying the pure air of the prairies, and expecting to return in a state of renovation, and perfectly ready to leave a card upon Muata yan-vo or any other ruffian. Meanwhile, ever yours,

R. F. BURTON.

EXHIBITIONS.—Colton's Map of North America and General Atlas, with descriptions, published in the United States; and a portrait of Baron Alexander Humboldt, were exhibited.

The Papers read were—

1. *Extracts from a Letter from DR. SHAW, addressed, by direction of the President, to CHICHESTER FORTESCUE, Esq., M.P., Under-Secretary for the Colonies, Aug. 24, 1860, on a Proposed Exploration in North-Western Australia, under Mr. F. T. GREGORY, F.R.G.S.*

“Aug. 29th, 1860.

“In April, 1859, an application was made by a party of the settlers, through the Colonial Department of Western Australia, for the assistance of a surveying vessel, then in those waters, to aid them in exploring that portion of the country lying between Shark Bay and the north-west coast, about Nicol Bay.

“A compliance with this request not having been at that time found practicable, it is believed that the plan may, with certain modifications, be at present urged on the attention of the Colonial Office. In furtherance of these views, it is necessary to explain that it is by no means intended to confine the desired exploration to the limited extent of country pointed out in the first place by the settlers, but that a favourable time has arrived for endeavouring to complete the chain of exploration and discovery round Australia, by filling up the unknown space of six or seven hundred miles which yet interpose between the late travels of Mr. A. C. Gregory, from the north, on the Victoria, and those of Mr. F. T. Gregory from the west coast. The advantages to this country, of having stations and ports of refuge along this line of coast, are clear; and as it has been ascertained, by the late expedition of Mr. A. C. Gregory, that cotton

grows *naturally* in the valley of the Victoria, it becomes highly probable that large tracts, intervening between that point and the northern settlements of Western Australia, may prove available for the production of this plant. Mr. F. T. Gregory, who has already most successfully made the farthest exploration to the north-east, beyond the settled parts of Western Australia, is at present in London, and is most willing to undertake the task of exploring the region in question, now a 'terra incognita;' and the Council recommend this subject to the favourable consideration of Her Majesty's Government, being well assured, from his antecedents, that Mr. Gregory is worthy of all confidence. Mr. J. S. Roe, the Surveyor-General of Western Australia (under whom Mr. Gregory has so long served), is also in London, and has expressed his willingness to afford every information in his power in aid of this expedition.

"The benefits to the mother country and the colony that may be expected to be derived from this exploration may be briefly described. In the temperate region which lies to the north of the Swan River colony there is good reason to believe that extensive runs for sheep will be found, calculated greatly to extend the production of Western Australia. Farther north, and within and about the tropic, copious rains are known to fall in the north-west monsoon; and it will only be necessary that this fall, which continues for the four months from December to March, inclusive, should be stored for use during the remainder of the year, to make the country irrigated by it eminently well suited to the great staples of cotton and rice, for which the prevailing climate seems perfectly well adapted.

"For the production of one of the two commodities (cotton), European labour is perhaps inapplicable; but European superintendence and capital, to judge by our experience of other cotton-growing countries, are indispensable. The most suitable description of labour may be that of India; and the portion of Australia now referred to may become a suitable colony for taking off the surplus population of India, already excessive, and likely in time to become much more redundant.

"Besides the staples of wool, cotton, and rice, it may be added that men of science have come to the conclusion that this district may be productive in gold and copper, as well as other minerals. Its timber may also become an export of value.

"It would be desirable in the first place to examine the tract of country that lies between the FitzRoy River, in long. 123° 40' E., lat. 17° S., and Nicol Bay in long. 116° 50' E., lat. 21° S.; embracing

thus about 430 geog. miles of coast-line, with such a depth inland as time and the physical character of the interior may permit," &c.

The letter concluded with recommending that either Nicol Bay, Depuch Island, Roebuck Bay, or FitzRoy River, should be selected as the point of landing; that the expedition should consist of seven or eight persons, equipped for about six months, and should arrive off the coast at the end of March. The rough estimate for total expenses was about 4000*l*.*

The second Paper read was—

2. *Exploration of the Districts near the Burdekin, Suttor, and Belyando Rivers in North-East Australia.* By MR. G. E. DALRYMPLE.

Governor Sir G. F. Bowen to the Duke of Newcastle.

Government House, Brisbane, Queensland,
12th April, 1860.

MY LORD DUKE,—With reference to my despatch No. 21, of the 16th February ultimo, I have the honour to report that Mr. George Elphinstone Dalrymple has returned in safety from the exploring expedition which he had undertaken to the North-Eastern districts of this colony.

Mr. Dalrymple states that he has considerably extended the knowledge already obtained by the researches of Leichhardt, Gregory, and Kennedy, of the rich and well-watered pastoral districts near the rivers Burdekin, Suttor, and Belyando, between the parallels 19° and 22° of south latitude.

He further informs me that he has discovered that the great river Burdekin flows into the Pacific Ocean, at a point a short distance north of Cleveland Bay, and not near Cape Upstart, as was conjectured by the late Dr. Leichhardt.

Should it be found that the mouth of the Burdekin is accessible to steam navigation, a great facility will be afforded for the rapid occupation of the neighbouring interior. To ascertain this point, it will be necessary that an expedition properly equipped should be sent by sea, at the expense of Government. Mr. Dalrymple offers to take charge of a fresh exploring party, and I feel persuaded that the Queensland Parliament will be disposed, on my recommendation, to vote a sum of money in support of this important

* The Colonial Office has since informed the Council that Parliament will be asked for 2000*l*. towards this Expedition, conditionally upon a similar sum being advanced by the Government of Western Australia.

enterprise.* I have communicated with Governor-General Sir William Denison as to the aid which might be given by Her Majesty's surveying ship *Herald*, now on the Australian station, but am informed that that vessel has been ordered home.

As the pastoral settlements of Queensland already extend within the Tropical circle, as far as the shores of Broad Sound, in about the 22nd degree of South latitude, there is little doubt that the new territory, of which Mr. Dalrymple speaks so favourably, will be stocked with sheep and cattle in the course of a very few years. Much of it is table-land, enjoying a cool and salubrious climate.

The aborigines in that part of the colony are reported as being very numerous and hostile, and as exhibiting more athletic frames and a somewhat higher order of intellect than the native tribes in these parts of Australia, where the climate is less genial, and where fish, game, and edible plants of various kinds are less abundant. Still, the six Englishmen who composed Mr. Dalrymple's party, though often attacked, were able to force their way through all opposition without the loss of a single individual of their number. Consequently there is every reason to expect that a few detachments of the mounted police-force, in aid of the energetic measures of self-defence adopted by the colonists themselves, will, in that quarter as elsewhere, suffice for the protection of any new settlement.

It has been rightly observed that from the circumstance of the aborigines of this island-continent being, apparently, subject to no sort of government except that of the strongest man in each tribe, from the imperfection of their arms, and from their mental incapacity for combination, their collisions with Europeans do not occupy that place in the annals of Australia which is filled by the Maories in the annals of New Zealand, and by the semi-civilised Mexicans and Peruvians, or even by the Red Indians, in the history of America.

I hope and believe that there is another and better cause for the comparative infrequency of serious collisions with the aborigines in Queensland and in the other Australian colonies. I allude to the humane and enlightened treatment which they now receive at the hands of the English Colonial authorities and of the settlers, who, while they energetically repel attacks on their own lives and property, seem always ready to employ, feed, and clothe the peaceful members of the neighbouring tribes. In fact, on almost all the

* This expedition, under the command of Mr. J. W. Smith, R.N., with Mr. Dalrymple, has since returned after having found that the Burdekin is closed by a bar at its mouth.—ED.

pastoral stations in Queensland, several blacks are maintained as shepherds, stockmen, and grooms; others are enrolled by Government in the Native Mounted Police; while, in the towns, as many as are willing to work can earn their livelihood as porters, messengers, woodcutters, and in other similar capacities. Efforts have also been made at the public expense, at various times and places, for the education of the aborigines, and for their conversion to Christianity; and I expect that these endeavours will be energetically resumed by the Government of Queensland, with the sanction of the Colonial Legislature.

Mr. George Elphinstone Dalrymple to his Excellency Sir George Bowen.

YOUR EXCELLENCY,—I beg to take advantage of your kind permission to address you on the subject of the exploration of the River Burdekin, which I lately had the honour of carrying out.

The country watered by the river and its tributaries, extending from latitude 18° to latitude 22° south, and from the Pacific far to the westward of Mount McConnell, I can confidently state from personal exploration to be undoubtedly capable of becoming one of the finest and largest pastoral and agricultural regions of Australia, and a most valuable adjunct to the colony of Queensland.

Very strong auriferous indications exist over a large area of country.

The rich low country along the coast, and the alluvial flats of the river, particularly in the fine broad valley of its lower course, are admirably adapted for Tropical cultivation, and especially for cotton, sugar, tobacco, &c.

An admirable route exists through this region for the passage of the proposed Anglo-Australian telegraph.

From the Gulf of Carpentaria to the Valley of the Burdekin, in about latitude $18^{\circ} 48'$, Mr. A. C. Gregory's intimate acquaintance with the country will doubtless enable him to recommend a practicable route. Thence I can confidently recommend its passage down the Valley of the Burdekin to about latitude $19^{\circ} 55'$; thence by that of the River Fanning on to the lower Burdekin, in about latitude 20° ; to follow up the Valleys of the Burdekin and Bowen Rivers to about latitude $20^{\circ} 50'$, and thence, traversing the immediate district watered by the Reid and Bonar, to pass over the table-lands N.N.E. of the heads of the Isaacs, run up Collaroy Creek, cross the coast-range on to the Broad Sound Waters of Waverley Creek in about latitude $22^{\circ} 18'$, and thence by the Valleys of Herbert Creek and the River FitzRoy to Rockhampton.

Should your Excellency advocate the establishment of this route, and its protection by a chain of police-outposts, I would venture to predict that the security which settlers would derive from the latter would tend to the speedy occupation of the Kennedy, and a large increase to the Queensland revenue.

As your Excellency's Government has decided upon throwing open the Kennedy on the 1st of August current, I would again beg most respectfully to draw your attention to the advisability of deciding upon a seaport for that district, and the establishment of the capabilities of the Burdekin as a navigable river.

I have the honour to state that I discovered the mouth of the Burdekin in the neighbourhood of Cape Cleveland, in about latitude $19^{\circ} 20'$ south, longitude $146^{\circ} 50'$ west; but owing to the smallness of my party, the inclemency of the weather, and the numbers and hostility of the aborigines, I was unable to carry out my intention of testing its depth and length of tideway.

The Bay of Upstart, which I visited, is particularly well situated with reference to the whole district, and possesses in itself great natural capabilities for a seaport.

It is sheltered by its stupendous Cape from the prevailing winds, and there is abundance of fresh water; the soundings of the bay are even at from 6 to 10 fathoms, on a sandy clay bottom; and a large salt-water creek connecting the heads of Upstart and Abbott bays is broad enough for a large vessel to swing, and gave soundings at 3 fathoms.

As the means at my disposal were insufficient to establish as a certainty the navigable capabilities of the Burdekin or the qualifications of its mouth or of Upstart Bay as seaports, I would now most respectfully beg to suggest to your Excellency the advisability of despatching an exploring party by sea, to enter the mouth of the Burdekin, take the soundings of that and of the heads of Upstart and Abbott bays, and to report to your Excellency's Government upon the capabilities of the same, and of the most advantageous positions thereon for the establishment of the future ports of this portion of the colony.

The communication was interesting as indicating a large district which might become hereafter fitted for settlement, and, moreover, a good roadstead discovered, which, as Sir Roderick Murchison observed, was most essential for the protection of our commerce in those parts.

The third Paper read was—

3. *Exploration of Central Australia from Melbourne, viâ Cooper Creek.*

THE Victoria camel expedition to explore the desert of Australia, by way of Cooper Creek, has already left Melbourne, and notes of its first fourteen days' march have been received. The exploratory caravan consists of 26 camels; besides these are horses and waggons to convey twelve months' stores to Cooper Creek, where a dépôt will be established. A large item in the stores of provisions is the "expedition-biscuit," which, like the well-known American meat-biscuit, consists of meat dried and pounded, mixed with a proportion of flour, and baked, and forms an exceedingly portable means of subsistence. The camels are supplied with leather shoes shod with iron, and carry waterproof coverings lined with flannel, to protect them in adverse weather. The party is under the leadership of Mr. R. H. Burke; the camels are under the charge of Mr. G. J. Landells; Mr. W. J. Wills, surveyor and astronomical observer, is the third in command; Dr. Hermann Beckler is the medical officer and botanist; and Dr. Ludwig Becker is artist, naturalist, and geologist. Besides these, are ten men, not including three Indian Mohammedans, who have the immediate charge of the camels.

On Aug. 20th the first start was made from Melbourne: thence the expedition has travelled by fourteen easy stages to Swan Hill, in exceedingly wet weather. There was difficulty in persuading the camels across the only creek that interrupted their progress. Some natives, who visited one of the camps, showed terror at the sight of the camels, and would not approach within spear's throw. The Indian attendants work well.

The PRESIDENT said, there were several interesting particulars in the paper from Melbourne which had been read, including a graphic description of the start of the caravan. The use of the camel was a new feature in the exploration of this country, and he hoped it would be attended with success; for the difficulties in the interior, arising from the want of water, were similar to those found in Africa and other sandy countries. At the starting of the expedition, not only hundreds but thousands of people congregated together to see the party leave, animated by high hopes of the advantages to be derived from success.* As Mr. Gregory was present, he hoped he would say a few words in explanation of the expedition from West Australia upon which he was about to enter, and of the views which had induced him to undertake it.

MR. GREGORY, F.R.S., proceeded to describe the physical character of that portion of the country seen by him in former expeditions in Western Aus-

* Although the Members of the Expedition have quarrelled among themselves, the leader left for Cooper Creek on the 19th of October, with 7 whites, 3 coloured men, 16 camels, and 19 horses.—ED.

tralia. The greater portion was exceedingly level, having an average elevation of from 900 to 1200 feet. It had a sandstone table-land of probably no great extent, and granite cropped out on the western coast with a few broken hills, occasionally rising to an elevation of 1800 feet. Proceeding northwards up towards the Gascoigne River, the country gradually rose, till the head rivers themselves had an elevation of about 1700 feet. The summit of the highest hill which he ascended amounted to 3500 feet. He therefore had reason to think that, although not absolutely a range of mountains, there was a tract of elevated country, forming a watershed, not only to the westerly, but to the eastward and north-eastward. His brother, in 1855 and 1856, traced a creek, which he named Sturt Creek (about 300 miles inland), from the table-land in which the Victoria River took its rise, and which was about 1600 feet above the sea at its greatest elevation; and in tracing it down he descended to a level of more than 900 feet. This fact gave him reason to hope that between that point, going towards Western Australia, and the elevated country in which the Gascoigne took its rise, there must be a depression; and he would venture to suggest, though he knew many geographers were opposed to the hypothesis, that a river was to be found, draining the greater portion of Western Australia, which emptied itself in somewhere about longitude 122° E., in the bottom of a low sandy bight on the north-west coast. Should that prove to be the case, there was every prospect of finding a way into Central Australia; should it be otherwise, he feared the country would turn out to be a low sandstone depression, probably covered with sandy desert, similar to what we had seen in other parts of Australia. The great object of his mission was to try and set that question at rest, and also to see whether lands suitable for colonisation could not be found on the north-west coast.

MR. WM. BURGESS said he had been a settler in Australia more than thirty years, and the expedition which was now proposed had been in some measure taken up in the colony at his instigation. He formed one of the deputation from the Society which waited upon the Colonial Secretary, and he hoped it would be arranged that the expedition should start from Nicol Bay, and explore south to meet the point attained in Mr. Gregory's former expeditions; and after that country had been thoroughly explored, and a port discovered fit for settlement, then the remainder of the six months to be devoted to exploring towards the north up to Roebuck Bay in search of a river. He was sorry to find that this plan might be changed, and that the expedition might start from Roebuck Bay.

SIR RODERICK MURCHISON said the Geographical Society had nothing to do with the details of Mr. Gregory's expedition, which must be settled in the colony of Western Australia. All that the Society had to do was to promote the science to which they were devoted, by appealing to the Government for a grant to enable Mr. Gregory to carry out his plan. The grant had been obtained conditionally, and whatever plan was carried out would, no doubt, bring a considerable addition to their geographical knowledge. He had always wished to see established some port on the north-west coast, both as a naval station and as a harbour of refuge, and it was a discredit to us to remain ignorant of the physical structure, the productions, and capabilities of that portion of the Australian continent.

COLONEL GAWLER, F.R.G.S., stood somewhat in opposition to Sir Roderick Murchison in his opinion that the centre of Australia was an arid desert. That conclusion agreed with Mr. Jukes's theory, but he thought Mr. Jukes was wrong in many points. First, in underrating the character of the Murray, which he spoke of as a stream that could hardly force its way into the sea. Now he had ascended the Murray 180 miles with Captain Pullen, at present of the *Cyclops*, in the Government cutter *Water Witch*, and they never drew less than 13 feet water, and in some places the depth was 40 feet; while at the

North Bend, the highest point to which they reached, the river was 250 yards broad. Again, Mr. Jukes imagined that the great interior was a vast tertiary mass, with very little primary formation in it. Now there was much of the primary formation known. The great base of the Australian Alps and of the Adelaide chain was of primary formation; and on the shores of the Port Lincoln peninsula he distinctly saw gneiss and mica-slate broadly developed and going away to the north-west into the interior. Therefore, with so much primary formation on the coast, there was no reason why it should not reappear in the interior, and all the consequences of drainage from those ranges, and soil formed by their detritus, occur in large extent. He admitted the fact that there was a desert to the eastward of Lake Torrens; but then, when he saw that there was a fine country far away to the north, to the eastward, and to the southward, he could find no reason to suppose that there was no fine country to the westward also. He felt confidence in thus thinking, for since his return from South Australia he had theorized, judging from atmospheric influences, that there was a fertile country to the north-west of Spencer Gulf, and since then there had been discovered a well-watered country half as large as Ireland. He also questioned the accuracy of Mr. Jukes's statement that Mr. Eyre, in his journey from the Port Lincoln peninsula to Western Australia, did not cross the mouth of one large drainage outlet. He passed for several hundred miles along the top of high chalk cliffs, and then came to a deep sandbank 130 miles in length, the cliffs going off north-west into the interior. Having traversed this sandbank, he came to cliffs again running along the shore, but which ward off north-east into the interior. As he came near the sandbank he found atmospheric evidences, in connexion with the flight of water-birds into the interior, which led to the conclusion that there was to the northward of him a great extent of well-watered country. It appeared to him that this sandbank was the bar of a great drainage coming down from the interior, formed by the tremendous rollers of the Southern Ocean. With facts such as these before us, we might reasonably conclude that in the western half of Australia there might be a large extent of good and well-watered country, which might serve to connect the south-eastern provinces with the north-west coast, as a transit for live stock, as well as for railways and telegraphs.

MR. A. ROE, Surveyor-General of Western Australia, said that, as a colonist, he must, to a certain extent, agree with some of the observations which had fallen from Mr. Burgess relative to the proportion which the colony was called upon to contribute to an expedition which, in itself, was only remotely beneficial to Western Australia. Yet, for all that, he hoped the expedition would meet with success, and that, as the object was to advance the general progress of geographical discovery, the colonists would cheerfully come forward and render all the aid in their power. With respect to the various theories which had been broached as to the interior of the country, he thought it was time all these were put aside, and that we went manfully to work in the path of actual discovery. Though Surveyor-General of Western Australia, he must plead total ignorance of the country about to be explored beyond what was known to any individual in the room, except that he had been in a vessel along part of the coast. Of the interior, however, he knew nothing. He thought the Geographical Society had acted wisely in accepting the services of Mr. Gregory. He had a great deal of personal knowledge of that gentleman, from having had him under his own eye in his department as Surveyor-General. He could speak to his fitness for the task, and he had no doubt that the expectations of the Society would in him be fully realized.

The fourth Paper read was—

4. *Abstracts from Letters from the East African Expedition under Captains Speke and Grant to the Secretary.*

THE latest intelligence received from Capt. Speke is dated Bagamoyo, Oct. 1st, 1860. He therein alludes to a previous letter, despatched from Zanzibar, which has not reached the Society. Very shortly after his arrival at Zanzibar, aided by the zealous co-operation of H. B. M. Consul, Colonel Rigby, Capt. Speke succeeded in procuring 56 porters, and in despatching them, in advance of himself, with beads and cloths, to Kazeh. These men had reached Ugogo. His next step was to send to the mainland, to collect 100 porters for his own caravan. He also secured an escort of 30 free labourers armed with muskets. Besides all these, the Sultan of Zanzibar presented him with the services of 30 men of his own establishment, under orders to accompany him to Egypt. The Ras Cafila, or head of the native portion of the expedition, is the same Sheikh Said bin Salem with whom Capt. Speke travelled before.

As to his Cape companions, he states:—"The Hottentot guard have shown themselves a very handy, willing set of men after they once settled down to work. They now adapt themselves and wear into the different stages of vicissitude in this vagabond sort of life famously; and if the climate—the great enemy of these regions—only spares them, we shall find them of the greatest service. There is nothing they cannot turn their hands to: they helped to sew the tent, make their own clothes, cobble their shoes, and cook our dinners. They love the gun, and delight in hunting for specimens; but some of them have already had the fever, and I cannot but feel anxious on that score."

The expedition left Zanzibar on the 25th of September, in a corvette belonging to the Sultan. The men were landed, under orders to form a camp four miles from the shore, where Capt. Speke expected to join them on the morrow of writing his letter. All the instruments, given to the expedition by the Indian Department, are described as first-rate in quality and in order.

"The accounts enclosed will show you to what extent I have been obliged to go to reach the point at which I expect to meet Consul Petherick by the time appointed. The expenses have been nearly doubled by this hurry to meet him, as anybody who has travelled in barbarous countries like this, must know that the man who pays best gets most; and I have been obliged to outbid the Arab merchants, to succeed in the short space of time which it has taken me to get so large a caravan together. I shall now certainly

be at my station at the appointed time for descending on Gondokoro, and must then come down the Nile the best way I can. My men are all inflated with the grand idea of reaching Egypt, and will expect a greater remuneration from me than the Government funds admit of; for it must not be conceived that what I have in store now, will be sufficient for the expenses of the way without some reinforcements from Kazeh; and to provide for this, I am carrying letters of credit of the worthy Suddha Damjee. But at the same time that I make this remark, I do not wish the Society to be under any apprehensions that I intend to depart from my engagements with them, or from the last injunction of the Indian branch of Her Majesty's Government, that I should not call upon them for any other assistance. I have made my own arrangements.

"The strength of the caravan is as follows, not including the 56 porters, and 2 men in charge, that have gone forward to Kazeh:—Capt. J. H. Speke, commanding expedition; Capt. J. A. Grant, assistant; Sheikh Said bin Salem, Ras Cafila; 1 corporal and 9 Hottentot soldiers armed with rifles; 3 private servants armed with rifles; 6 slaves of Ras Cafila, all armed with rifles; 30 free labourers, ditto; 34 Sultan's porters; 115 Paganees—total, 192; 11 mules; 5 donkeys. In addition to these, his Highness the Sultan of Zanzibar has ordered a guard of honour, consisting of 25 Belooches, to escort us as far as Kidunda.

"We are now off to Bomani, and will send our next report from Kidunda, in the hands of the escort."

Government House, Cape Town, 14th July, 1860.

SIR,—I have the honour to report, for the information of the President and Council of the Royal Geographical Society, that the Central African Expedition, under my command, arrived here, in H. M. S. *Forte*, on the evening of the 4th ult., all safe and well; that the Admiral of the station has placed H. M. S. *Brisk* at my disposal for proceeding, as soon as the vessel can be got ready, direct to Zanzibar: this probably will take place on Monday, the 16th inst. Further, that his Excellency Sir G. Grey, Governor of the Cape of Good Hope colonies, who, from the first time that I became acquainted with him, and explained the purport of my intended exploration, has ever shown a lively interest towards it, has, since my arrival here, obtained for my purposes an escort of Hottentot soldiers, his own body-guard, and also a grant of money to enable me to purchase twelve mules, as baggage animals for the expedition.

The enclosed letters will explain on what grounds, and through

what immediate channels, the soldiers and mules have been obtained.

I have to acknowledge the receipt of your letter dated the 25th May, 1860, with its enclosures.

As there is and will not be any ordinary means of communicating with Zanzibar by this route, I shall feel obliged by your sending *all* letters or packages *via* Aden for the future.

*His Excellency Sir George Grey to His Excellency Lieut.-Gen.
Wynyard, C.B.*

Government House, Cape Town, 9th July, 1860.

SIR,—An expedition has been sent out, under the command of Capt. Speke, of the Bengal Infantry, for the purpose of tracing the river Nile from its sources into Egypt. A great part of this route has been already travelled, and is now well known; but there is an intermediate space of from 300 to 400 miles inhabited by tribes of whose disposition nothing has yet been ascertained. It is, therefore, requisite that the expedition should be accompanied by a few daring and resolute men, if possible, natives of Africa.

Capt. Speke is now at the Cape of Good Hope, on his way to Zanzibar, from which place the expedition starts for the interior of Africa; and I am anxious to afford to the Hottentot soldiers of the Cape Corps an opportunity of sharing in the honour of this adventurous expedition. By showing courage and good conduct on it, they would bring great credit on the corps to which they belong; and it would be for all time a most interesting fact if some of the native inhabitants of South Africa, trained in our service, aid in the discovery of the sources of the Nile, that great problem in North Africa which has for so many centuries baffled all inquiries which civilized man has made regarding it.

I should, therefore, feel much obliged to you if you would allow twelve Hottentots from the Cape Corps to volunteer for this service if they are willing to do so: none but men of good character and of known courage and hardihood should be taken.

The men employed on this service will draw their full pay, and free rations, such as the nature of the country they are in may afford, will always be provided for them. A free grant of 25 acres of land each in Her Majesty's possessions in South Africa will also be given, on their return, to such of these volunteers as may bring with them a certificate from the officer commanding the expedition that their conduct, whilst serving on it, has been such as to entitle them to this indulgence.

I have, &c.,

G. GREY.

Message, No. 28.

G. GREY, Governor.

Government House, 9th July, 1860.

The Governor acquaints the Honourable the House of Assembly that, under the instructions of the Royal Geographical Society of London, an Expedition has been fitted out, jointly by the British Government and the Government of India, with a view of tracing the river Nile from its sources into Egypt, and of thus solving this important problem, which has been for so many centuries a source of such great perplexity and interest to the civilized world.

Captain Speke, the commander of the exploring party, has arrived at Cape Town, together with Captain Grant, of the Bengal Army, for the purpose of organizing the expedition. The Governor, anxious to identify this colony with an enterprise which is deservedly exciting such great interest in Europe, has obtained the sanction of the Commander of the Forces to call for Hot-tentot soldiers from the Cape Corps, as volunteers, to proceed on this service, for which they possess some peculiar qualifications; and the necessary number of men have, with the most creditable alacrity, enrolled themselves as willing to accompany the party.

Since Captain Speke's arrival here it has been thought that the chances of the success of the expedition would be very materially increased if mules could be secured for it, as a means of transport, instead of trusting to being able to hire at Zanzibar men to convey the baggage which must accompany it.

The British Government has contributed 2500*l.* to the expenses of this expedition, and the Indian branch of Her Majesty's Government bears charges connected with it which will amount to a larger sum;* but no funds have been provided for the purchase of the mules which it is now desired to send, and which it is estimated can be provided for about 300*l.*

The Governor, therefore, wishes to know if the Honourable the House of Assembly would think fit to make good this amount of 300*l.* from the revenues of the colony, as the contribution of this Government to the expenses of an enterprise in which the Cape of Good Hope has an interest more direct than might at first be thought, as it now appears tolerably certain that a vast tract of fertile country extends along the high lands of the interior, from the confines of this colony to the Equator, which not only affords a field for the spread of population, but appears already to promise commercial openings from which great advantages may very shortly be derived.

House in Committee.

Mr. Stretch in the Chair.

The Chairman read the Message from His Excellency the Governor, on the subject of the Expedition for tracing the sources of the River Nile.

The Colonial Secretary moved: That the Committee recommend the House to vote the sum of 300*l.* for the purpose stated in his Excellency the Governor's Message No. 28.

Agreed to.

The Colonial Secretary moved: That the Chairman report this Resolution to the House.

Agreed to.

* Among which were presents to the value of 300*l.* for the Sultan of Zanzibar and others, by command of Sir Charles Wood, of the India Board. By permission of the Admiralty, Captains Speke and Grant were also most kindly allowed passages in H.M.S. *Forde* to the Cape, and thence to Zanzibar in H.M.S. *Brisk*.

H.M.S. Frigate *Forte*, Madeira, 9th May, 1860.

SIR,

Having observed in the last Journal of the Royal Geographical Society an allusion to the course I have given to the Kivira River published in 'Blackwood's Magazine' (1859), which is opposite to what I had described in my original map, made at Kazeh, I have now the honour to send you my reasons for the change, that any doubts which may arise in the minds of such geographers as may have copied my map in 'Blackwood' may be dissipated.

The only man that the expedition met with who had crossed, or even seen, the Kivira River, was a slave belonging to Musa, and he was of the Wanyoro tribe. Further, I was the only person who interrogated the man about the river, and the sort of country through which it flowed.

The slave told me the Kivira River was larger than either the Kitangule or Katonga rivers, but, in opposition to them, was very rapid, and flowed through hilly instead of flat ground. Further, he insisted, contrary to my suggestions, that it flowed to the north or north-west; that is, in a direction contrary to the generally-acknowledged direction of the lake.

I could not, at that time, understand how this could possibly be the case, but thought the river must have originated in the Mountains of the Moon, and that it flowed towards the lake; I therefore altered it accordingly, in the same way as I made the Arabs, in opposition to their first statements, acknowledge the flow of the Kitangule and Katonga to be.

The Arabs first said those two rivers flowed from the lake into the mountains. As I changed one, I changed all.

It may appear arbitrary, changing the directions which natives give to rivers, but it cannot always be helped, for they are often unable to explain themselves. It therefore requires that a person should be possessed of a thorough knowledge of the physical features of the country through which the river runs, to determine if the natives' mode of expression be correct about the course of its flow.

Thus, then, I placed the Kivira River on my map, when at Kazeh, as though it ran into the lake, knowing nothing at that time about the drop of the country to the northward of the lake, and having no books or maps of the Upper Nile to guide me, for the expedition was not provided with any works relative to the results of the Egyptian expeditions on the Nile.

The expedition now left Kazeh for Zanzibar. On the way, at Ugogo, an Arab merchant, by name Abdullah, coming from the coast, arrived at our camp and sold some cloths to me for the expedition. Whilst doing so I asked him about the northern country and the Kivira River. He replied that he had heard of the river, but only from native report, when he was in the northern countries trading, and his description coincided with that of Musa's slave.

In questioning him about the tribes which inhabit the country beyond the Kivira River, he gave me a long list of names, amongst which was the Bari people. To this word (Bari) I objected, saying, that as all tribes' names began with the prefix "Wa," he ought to have called them Wa Bari. But he said no, this was exceptional; and I therefore entered it on my map *at once*, as given by him; more, certainly, with a view of keeping it for future reference than for any other purpose, as it was given only on the authority of slaves to him, which fact he was particular in stating. This man, Abdullah, farther told me, *on native testimony*, a (*current*) story about navigators, using instruments, approaching the farther end of the Nyanza, which, as before (I heard of these navigators at Kazeh first), I did not believe to be anything more than a traveller's tale.

Now immediately after I arrived in England, when drawing up a sketch of the geography of our journeys to illustrate my map, I consulted Mr.

Findlay about it, and he very obligingly furnished me with the various accounts of the Egyptian Expedition on the Nile, and showed me how nearly my lake came to their position, in $4^{\circ} 44'$ North latitude. Next he detected the word "Bari" written on the map I had sent home, and this in an instant awakened me to the whole truth of the various stories which I had heard.

There were the navigators, there the hilly ground and rapid river, there the Bari people.

The fifth Paper read was—

5. *Notes on South Africa.* By Mr. JAMES CHAPMAN.

Otjimbingue, 30th Jan. 1860.

MY DEAR SIR GEORGE,—Fearing that some vessel may be leaving Walwich Bay before I can reach it, I send this to inform you of the failure of my trip to the south bank of the Zambezi, and my return from Lake Ngami to the Cape, until such time as I shall be able to refit for another expedition.

I think, if my memory serves me, when last I addressed your Excellency our troubles had already commenced. Bad and disaffected servants, a thing almost wholly new to me, made me all along doubt the success of my expedition, and give it up on arrival at the Lake; and one of my principal men dying of fever, and several others having been laid up with the same malady, would, in any case, have prevented my going any farther than the Lake this year, which, as your Excellency is aware, was to have been but our starting-point. Mr. G. Polson, who accompanied me, left for Moselekatze, with the only useful and able white man we had, and I have great expectations of receiving information from him that will be useful to me in my next attempt.

Of this short route, now so much travelled, there is nothing new or interesting to relate more than what has before been mentioned. We have had an uncommonly dry season, and on our way up lost about twenty of our cattle, chiefly from want of water; a few were stolen by poor Damaras, three of whom were shot in a most barbarous manner, to our great annoyance, by a party of Namaquas whom we had sent in search of our cattle and horses, which had been abandoned by our thirsty servants in the middle of the desert.

The want of water has not been confined to one district, but in the whole country up to the Lake the fountains have failed; and if the desiccation continues a few years longer at the rate it has done during the last four years, I fear we shall only be able to reach Ngami during the rainy season. In going up we had to dig at

Koolie, Ghansi, and Gunigga; and other large springs where, a few years ago, hundreds of elephants, rhinoceri, giraffes, and large herds of smaller game drank during the whole dry season, have now dried up so much that scarcely a kettle of water can be got for Kaffirs. At Piet-fontein, formerly a large running-stream, we had to dig for water for our cattle on our return, even after the first rains had fallen. Tunobis, in Damaraland, which was a fine running-stream when I first knew it, has been drying up so fast that now we have to wait in wells twenty feet deep until the water percolates to fill our vatjies—watering the cattle at these is out of the question.

With regard to sporting we have been singularly unsuccessful, but in this we were not disappointed, for we did not expect to see game until we had passed the Lake. I would have accompanied my friend Polson for a few weeks' elephant-shooting down to Botlethe River, but, attacked with a virulent whitlow on a finger, I have been unable to use a gun for more than four months. We have all had a turn at sickness—in fact, we have been a moving hospital the greater part of the way.

The Namaqua Hottentots of Lambert living at Twas have been successful in reaching a family of diminutive elephants, which I have before mentioned by the name of Makolonkoans, in the Kalihari Desert, where they subsist on tubers, and never need water. They were, however, obliged to abandon the tusks (of forty elephants) for a time, and ride hard to get back to the water, from which they were absent four days. Other Hottentots from Amiral Lamberts have made a successful hunt northwards, where they struck Messrs. Green and Anderson's spoor. From them we learnt that Mr. Anderson had reached a tribe called Ova Kaangarra, or Ovalingue, on a fine river (the Okavanga), in about lat. 17° s., and long. 18° e., but was detained there by fever. These reports were verified a few days ago by the arrival of Messrs. Anderson and Green, who bring glorious news for those who wish to distinguish themselves. They report elephants to be just as numerous as Gordon Cumming found them in the Bamaŋgwato country, so that I may yet be in time to make up my number here, if unsuccessful on the eastern side of the continent. Mr. Frederick Green, who went to assist Anderson out, and who is an admirable shot and indefatigable hunter, has, during an absence of a couple of months, shot sixteen very fine elephants, and as many as four large bulls in one night. Small game Mr. Green reports very scarce in those parts.

Of all our little disappointments I regret none more deeply, and
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I am sure your Excellency will sympathise with me when I say that I come back without one good photograph. I feel it the more, knowing that no exertion has been spared to render my efforts successful. Many whole days, again and again, have I devoted without any favourable results.

The principal cause of failure in this I attribute to atmospheric influence on the chemicals, or bad water used in washing and developing; of this, of course, I am not certain until I have consulted some one who understands fully the nature of the chemicals, and the theoretical part of the business. I am consoled, however, in this, by having a companion in misfortune. Dr. Holden, a scientific gentleman whom I met, informs me that he has not had one success.

Mr. and Mrs. Thompson, whom we met at the Lake, arrived here a few days ago, and Dr. Holden a few days later.

We heard very little about Dr. Livingstone while at the Lake, as the Makalolo and Batavana have again stopped intercourse. At my repeated solicitation, the chief sent a party to the Mahabee flats to seek some information, and all they brought was, that Dr. Livingstone had induced Sekeletu to remove his town, or part of it, farther eastward on the plains, I should say somewhere on the north bank of the falls. Lechulatile was expecting an attack from the Makalolo about January or February, and was preparing to receive them. We heard that a party of missionaries had penetrated Moselekatze's country, and another party (Rev. Mr. Helmore's) were waiting in the neighbourhood of the Botlethe for rains to cross the Madenisana Desert to Sekeletu's. The Lake has been very full for the last couple of years, and the Botlethe River has filled up the great salt lake (which I discovered in 1854) with fresh water from Ngami. It is very likely that the Natwutwa, if still inundated, may offer an impediment by that the nearest route to the missionaries.

(Signed) JAMES CHAPMAN, JUN.

*His Excellency Sir George Grey, K.C.B., &c., Governor
of the Cape of Good Hope.*

DISTANCES BY TROCHIAMETER.

From	To	Distances.		
		Miles.	Fur.	Yds.
Walwich Bay	Oesip	36	0	166
Oesip	Tingas	31	3	155
Tingas	The Pass	10	1	157
The Pass	Plat Klip	13	0	120
Plat Klip	Witwater	12	1	58
Witwater	Tsonbis	11	6	58
Tsonbis	Otjimbinque	21	7	41
✦ Otjimbinque	Otjemonjeba	33	7	211
Otjemonjeba	Otjekango	9	0	90
Otjekango	Barmen	5	2	149
Barmen	Otjethelba	15	0	150
Otjethelba	Gons da Gnaus	16	7	107
Gons da Gnaus	Eikanis	12	0	120
Eikanis	Jan Jonker's (Quaiep)	20	7	103
Jan Jonker's	The Turnaway	13	0	0
The Turnaway (from Quaiep)	Nosop	9	4	144
Nosop	Jonker's brother-in-law's place	36	0	85
Last place	Wit Vley	24	6	9
Wit Vley	Kabi Kobis	5	0	94
Kabi Kobis	Elephants' Fountain	25	5	40
Elephants' Fountain (by south- ern road)	Twas	35	0	0
Elephants' Fountain (by north- ern road)	Twas	48	2	132
Twas	{ Pass (in the range at the Damara village) }	33	0	0
Damara village	Sand Fountain	16	6	32
Sand Fountain	Elephants' Kloof	9	4	144
Elephants' Kloof	Riet Fountain	57	1	117
Riet Fountain	Gnathais	30	6	161
Gnathais	Fort Funk	9	2	57
Fort Funk	Ghanzi	26	6	73
Ghanzi	Thounce	25	3	135
Thounce	Koobè	23	0	99
Koobè	Lake	45	5	54
West end of lake	Chief's town at east end	38	7	90

DISTANCES BY TROCHIAMETER—*continued*.

Place.	Latitude.*			Longitude.*		
	°	'	"	°	'	"
Walwich Bay	22	53	26	..	..	..
Oesip	22	43	57	..	..	..
Otjimbinque	22	20	0	16	5	30
Barmen	22	5	37	16	42	56
Eikanis	22	33	0	17	6	15
Quaiep	22	30	20	..	..	..
Wit Vley	22	24	50	18	26	0
Elephants' Fountain	22	26	15	..	..	..
Twas	22	35	30	19	20	25
Riet Fountain	21	53	0	21	0	30
Gnathais	21	52	45	..	..	..
Fort Funk (Gnuegga)	21	49	38	..	..	..
Koobè	21	27	53	..	..	..
Lechulatèbe's Town	20	21	34	23	39	58

* The nature of the observations by which these results have been obtained is not explained.

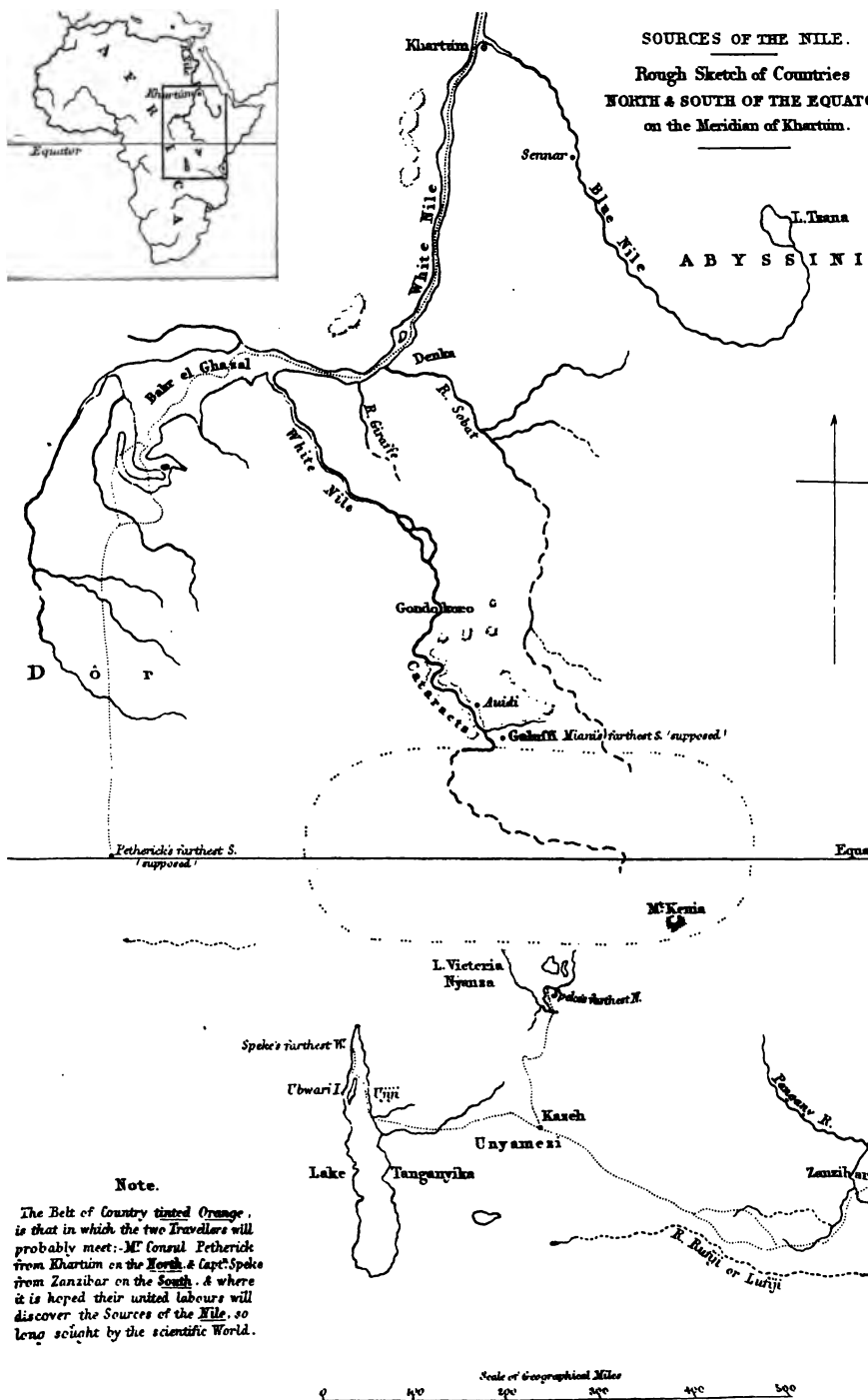
HEIGHTS BY BOILING WATER.

	Feet.		Feet.
Lechulatèbe's Town	2260	Twas	3950
Ghanzi	3352	Quaiep	4463
Fort Funk	3310	Awass	4643
Riet Fountain	3450	Eikanis	3860
Elephants' Kloof	3752	Barmen	3575

Consul Petherick's Expedition up the White Nile.

MR. CONSUL JOHN PETHERICK, at the request of the President, pointed out the difficulties and dangers which Capt. Speke would encounter in his progress from the hostility of the tribes north of the Equator. He would be unable to obtain porters—the only means of transit at his disposal—to proceed from one tribe to another, and without porters it was impossible he could proceed. His guard would have sufficient work to carry their own ammunition and fire-arms; and as no beasts of burden existed in these countries, he must have negroes to carry his provisions and beads. Should he succeed in reaching Gondokoro, his stock of beads would be exhausted; and from the pastoral character of the natives and their disinclination for work of any kind, particularly agricultural, he would have great difficulty in obtaining grain for the support of himself and people. Moreover, if he does not time his arrival at Gondokoro between December and February, when Arab merchants from Khartúm arrive at that place in boats, he will not obtain the means of transport down the Nile. It was necessary, in order to ensure the suc-

SOURCES OF THE NILE.
Rough Sketch of Countries
NORTH & SOUTH OF THE EQUATOR
on the Meridian of Khartum.



The Belt of Country tinted Orange, is that in which the two Travellers will probably meet:- Mr Consul Petherick from Khartoum on the North, & Capt. Spoke from Zanzibar on the South, & where it is hoped their united labours will discover the Sources of the Nile, so long sought by the scientific World.



cessful termination of Captain Speke's mission, that he should be met at Gondokoro with boats, provisions, and men; and if gentlemen would contribute towards the expense of the expedition, he should be most happy to devote his time and services to the object in view.

The PRESIDENT announced that subscriptions would be received at the Royal Geographical Society, 15, Whitehall-Place, in aid of Consul Petherick's Expedition, to co-operate with that under Captains Speke and Grant, *viâ* Khartûm and the Upper Nile.

The meeting then adjourned to Monday, November 26th.

Second Meeting, Monday, November 26th, 1860.

LORD ASHBURTON, PRESIDENT, in the Chair.

PRESENTATIONS.—*H. Cartwright, Esq.; Consul T. J. Hutchinson; and Captain S. Hyde, were presented upon their election.*

ELECTIONS.—*The Rev. L. J. Bernays; the Earl of Dunmore; Major J. B. Edwards; Lieut. A. Giffard Glascott, R.N.; Colonels W. L. Grant and W. R. Haliday; R. W. Keate, Lieut.-Governor of Trinidad; Lieut.-Colonel W. K. Loyd; Rev. R. Comyn Lumsden; Capt. Sir F. Leopold M'Clintock, R.N.; Capt. R. Playfair; Rev. G. Richards; Lieut.-Colonel L. Shadwell; Consul Don Ramon de Silva Ferro; Colonel Sir Anthony Sterling; Assist. Comm.-General E. Strickland; T. S. Begbie; H. W. Birch; A. Cave; J. Rodney Croskey; T. Devine, Chief of Surveys, Canada; N. Gould; B. Handley; A. Jessopp; F. Perkins, Mayor of Southampton; W. Richardson, M.D.; J. Sheren; J. C. Sim; J. W. Sullivan; and J. Irvine Whitty, D.C.L., Esqrs., were elected Fellows.*

EXHIBITIONS.—A globe, in relief, by Thury and Belnet, published at Dijon; Sonnenstern's map of Central America; Russian map of Northern Asia; and Johnson's deep-sea thermometer, were exhibited at the meeting.

ANNOUNCEMENTS.—The PRESIDENT stated that information had been received from Captains Speke and Grant of the successful starting of their expedition, and he trusted the Fellows of the Royal Geographical Society and the Public would join in promoting its equally successful termination, by contributing to the fund that was being raised to enable Consul Petherick to meet them with provisions and men on their arrival at Gondokoro. The Council of the Society had departed from their rule and allotted out of the funds of the Society 100*l.* for the purpose, and the Foreign Office

had contributed a similar amount. Private individuals had also subscribed something, but still without the assistance of the Public, this would be insufficient. It was intended to send to every Fellow of the Society a circular containing a statement of the difficulties which Captains Speke and Grant would probably have to encounter, and what was proposed to be done to provide for the safety of these adventurous men.

The Paper read was—

On the Physical Geography of the Sea, in Connection with the Antarctic Regions.

By Captain M. F. MAURY, U.S. Navy; Corresp. F.R.G.S., etc.

THE PRESIDENT next said they were aware that the principal subject of the evening was a paper to be read by a geographer who had done them the honour of coming among them from the United States; a gentleman of world-wide reputation, who by the energy of his character and the power of his arguments had induced civilised nations to concur with him in adopting one great plan for ascertaining the meteorology of the ocean. He had collected the records and observations which had as yet been made upon the subject, and, with the assistance of the maritime nations of the world, was in course of receiving further information.

CAPTAIN MAURY, U.S., after detailing the statistical results of his labours for several years in this previously unexamined field of inquiry, proceeded to dwell specially upon the effects of the winds and currents in the southern hemisphere. He pointed out that, by a knowledge of the set of the winds, sailing vessels had been able to make greater average runs than any steamers had yet been able to accomplish, and this solely by attention to the force of the winds in certain southern latitudes. Before the course of the Gulf-stream was known, ships from Europe to New York in winter used to sail, first to Charleston, South Carolina, then coast it down to the Hudson. The voyage used to occupy them from six to eight months. The Nantucket fishermen were the first to discover the course of the Gulf-stream, and while English captains were taking six months to reach New York, they used to make the run sometimes in one month. Vessels running north of this stream in winter get their sails and rigging frozen, so that it is scarcely possible to make any headway. By running into the stream they thaw it, for the water is always warm, and is known by this and its intense dark-blue colour. It is provided as a reservoir of heat by the Great Governor of Worlds to accomplish his grand purposes. It is the influence of this stream which renders the climate of Britain so genial. Were it diverted to break upon the coasts of Spain only, the island of Britain would soon become a bleak, cold, and inhospitable region, with a climate as cold and a winter as long as Labrador; and Erin would cease to be named the Emerald Isle, for her fields would be covered

with snow during eight months in the year instead of green herbage. Captain Maury, in his observations to the meeting, dwelt also very prominently upon the characteristic difference in temperature, &c., between the Arctic and Antarctic regions. The mean average height of the barometer in low southern latitudes was about $28^{\circ} 2'$, and was never so high as 31° , whilst Captain M'Clintock had found it above that in 77° north latitude. The range of the barometer was invariably 1° lower at the least in corresponding latitudes in the northern and southern Polar regions. This was attributable, in one respect, to the preponderance of land and ice in the northern circle, and the greater quantity of sea in the south. Hence, as was noted in Keith Johnston's 'Atlas of Physical Geography,' the rain-gauge indicated a fall in Patagonia of 153 inches of rain in 41 days. In South Shetland, in 63° south latitude, a minimum thermometer, which had been left on shore there by some whalers for a long period, never registered a lower degree of cold than -5 ; whereas in 32° latitude in the United States they had a greater degree of cold than this. Another point on which he dwelt with some emphasis was the greater amount of force of the south-eastern trade-winds over the north-eastern, which might be characterised as 13 and 11 lbs. respectively of force to the square foot. He had calculated from the logs the speed of at least 2200 vessels from the Cape of Good Hope to United States ports, and had also had the experimental results of Admiral Chabannes to corroborate his views; and while vessels with the south-east trade-winds abaft made an average of $8\frac{1}{2}$ knots per hour, those going with the north-east trades made scarcely half that speed. After adverting to many other purely practical matters, Captain Maury concluded by urging upon the attention of the Royal Geographical Society the importance of extending the field of research in the Southern Polar regions, of which so little was yet known, while that of the Arctic regions was now pretty thoroughly explored and mapped. It might be asked what good would result from prosecuting this field of research? And perhaps it would be difficult to answer this question properly, so as to satisfy all. That there was, however, an untold mine of wealth there, even in a commercial point of view, he fully believed. The value of the fur seal fishery was something fabulous. He had conversed with an American whaler who had been concerned in the capture of more than 300,000 fur seals, and the value of their skins in one season was about 40 dollars each. But there was, moreover, a great deal of unexplored land there, which it was highly desirable to see defined; and as the climate was so much milder than the northern latitude, who could tell what openings for commerce

might arise there? Here was a field for exploration lying within eight or ten days' steaming of an important British possession (Victoria), and which was yet as little known as the interior of the moon. He trusted the Royal Geographical Society would do something towards removing this stigma on British enterprise. For the last twenty years France, England, Russia, and the United States had done nothing in the way of exploration in this quarter. Sir James Ross had penetrated farther south than any other navigator, but it was still no very arduous matter for some explorer to seek out a winter harbour, and ascertain whether there was not a secure anchorage for one or two vessels, from whence exploring parties might prosecute their researches by land and sea, by boats or over the ice, and tell the world what they had seen, and whether there were any mineral or other industrial resources available in that quarter. The prosecution of this enterprise lay at their own doors. If they made not haste to undertake the duty, it might be that the go-ahead American nation would be yet before them. If the British nation neglected this duty, it would be a reproach to them in after ages that they had neglected so fair an opportunity of adding to their maritime laurels, and to the high reputation they had already attained for ocean discovery and research in high latitudes.

ADMIRAL FITZROY, F.R.G.S., said it was impossible to estimate how immense was the debt which all countries owed to Captain Maury for the system of collecting and classifying observations which he had suggested, and which had been productive of such useful and practical results. Captain Maury came over to this country many years ago and asked for assistance in collecting the information and experience of navigators, but at that time his views were not considered of sufficient importance to induce the active exertions of this country in the cause which he had at heart. Hitherto the experience of the seaman had, as it were, been only available to himself; but by the method of collecting information adopted by Maury, the experience of the whole maritime world was made available for future generations. He should like to mention one fact with reference to the means by which Captain Maury had already effected so much. Through the United States Government he had been enabled during the last five years to disperse among our own countrymen, in our ships, on our waters, and for our special benefit, no less than 700 large quarto volumes of Sailing Directions, which had been eagerly asked for by every captain of a ship that had to make a foreign voyage. In addition to this, more than 12,000 large sheets or charts, each worth not less than 3s., had been distributed gratis, and not only distributed gratis, but sent to the persons who were willing to make use of them, and to collect similar observations for future use. For fifteen years had Maury been at work for the benefit of his fellow men; and if within the next few years, assisted by fellow-labourers in various parts of the world, similar operations were carried on as zealously, there could be no doubt that the most distant regions which could be reached by sea, their various peculiarities and atmospheric phenomena, would become as familiarly known as the Atlantic and the Bay of Biscay.

CAPTAIN JANSEN, of Holland, said, the practical result in his country had been to shorten the passage of ships to Java by a mean average of ten days,

and to Australia by eight, ten, and fourteen days. He had himself made the passage from England to Australia, following Captain Maury's sailing directions, in fifty-nine days, while another captain, who boasted that by making the passage along latitude 88° he would beat Captain Maury's route by at least ten days, was seventy days on the voyage, and upon arriving at Australia was astonished to find that he (Captain Jansen) had been so long in port.

CAPTAIN J. WASHINGTON, Hydrographer R.N., F.R.G.S., said he could not resist stretching out the right hand of fellowship across the Atlantic to the gallant Captain Maury, who had so nobly aided us in the cause of navigation. If our ships and our whalers made good voyages, it was to him that we were indebted; and he cordially agreed with him that no part of the world should be left unsearched that could in any way throw light on the subject of meteorology, and thus enable us to make voyages still more rapidly. Captain Maury, however, concluded his address by saying that it rested with England to explore the Antarctic regions. Now, ought we to accept so great a charge without a little inquiry? England had done her part in promoting voyages of discovery. Cook in 1770 and Ross in the present century, both celebrated circumnavigators, had visited these regions; and the South Shetland Islands were discovered by James Biscoe, in the employ of Mr. Enderby of London. Two celebrated Russians and two celebrated Frenchmen had also explored the Antarctic regions. With these facts before him, he would ask whether it might not rest with the United States to take up the question and to send out an expedition? They would meet, no doubt, with every assistance at Melbourne, or, if that place did not suit them, there were the islands of New Amsterdam in the Southern Ocean, frequented exclusively by American whalers, from which an expedition might be advantageously despatched. England and France had as yet done more to explore these regions than the United States, and, believing that there was at present little probability of our sending out an expedition, he ventured to suggest to Captain Maury that his countrymen should do it, and he could assure him that they would have our best wishes and cordial co-operation.

CAPTAIN SIR F. L. M'CLINTOCK, R.N., F.R.G.S., said as he had just returned from the Arctic regions he might be permitted to say a few words upon the formation of icebergs in support of the theory as to the existence of a large continent at the South Pole. So far as he had been able to see, it was necessary that there should be high land upon which glaciers were formed in the first instance. They were formed by deposits of water and snow, and were forced out by the pressure of the accumulated mass behind, until they were finally launched into the sea. And it was also necessary that there should be a vast quantity of moisture in the atmosphere to cause the rain and snow from which the glaciers were formed. On the shores of South Greenland there was a vast deal of moisture, and on the land a vast deal of glacier stretching continuously from the shore to a short distance inland; but advancing farther into the straits, and leaving the region of moisture behind, the region of the glacier was left behind. The two conditions which Captain Maury mentioned as necessary for the formation of glaciers existed in the north, and where those conditions did not exist, there there was no glacier. With high land and abundance of moisture there was abundance of icebergs, while farther north, in the Archipelago of Barrow Straits, with a drier atmosphere, icebergs were not seen.

CAPTAIN SIR EDWARD BELCHER, R.N., F.R.G.S., also spoke of the formation of icebergs in the Arctic regions. From the beginning of September snow fell upon the mountains of Greenland to the southward, and continued to fall till November or December, when the cold became so intense that no more snow could be formed. In the following summer the sun thawed these

accumulations of snow, which flowed from the face of the cliff and formed layer after layer of ice, until at last the attachment of the ice to the parent stock of the mountain was so weak that it fell off into the sea and became an iceberg. Nothing was known of a salt iceberg, and there could be no formation in the sea of an iceberg. All icebergs were pure fresh-water formations. With respect to vapours on the Labrador coast, they would be due to the warm water of the Gulf-stream, which the cold air above would condense and cause to evaporate in the shape of fog, as we knew it did on the banks of Newfoundland. An equatorial current, similar to the Gulf-stream, passed down the coast of South America round Cape Horn, and no doubt caused the vapours which Captain Maury had referred to there. With the intense cold and the want of summer which we found at the Antarctic regions, it was impossible, he thought, for ships to find safe anchorage there, so as to be able to pursue the inquiry which Captain Maury wished to effect. If he were to go, and were to find a suitable harbour, he would let his vessel be frozen in and make the necessary observations during the winter, but he would take good care that some one should come next year to look for him.

DR. JOHN RAE, F.R.G.S., fully concurred with what had been said respecting icebergs. But he had witnessed another mode in which icebergs were formed, and that was by drift-banks over a precipice. When the wind prevailed to the north-west on lands having a south-west exposure, these banks were drifted up in the winter by a succession of snow-drifts. They sloped out to the sea, and he had seen them, in one storm, drift to the height of thirty or forty feet. As soon as the thaw came, the snow thawed at the top, and the water, percolating through the snow, got down to a temperature below freezing point, and froze the whole mass into solid ice. In this way there would be at times as much as thirty or forty feet of solid ice left over to the next season, when a second drift would take place. Thus, in time, a bank of solid ice would be formed, projecting out into the sea, and by the action of water and changes of temperature it broke off and formed an iceberg. He had also enjoyed the opportunity of witnessing the ice-flakes in Greenland, the appearance of which he described.

CAPTAIN MAURY, in reply to Captain Washington's remarks, said the United States also claimed Captain Cook as belonging to them, inasmuch as the Americans were British subjects in the time of Captain Cook. As for what the British Government had done for navigation, the office over which Captain Washington presided was the great centre of the hydrographical information of the world. All that he meant in his remarks was, to give fair warning that if England did not undertake these explorations, the Americans would show the way. He was happy to hear that his remarks about icebergs were confirmed by gentlemen who had had much more experience upon the subject than himself. With regard to the currents to which Sir Edward Belcher had alluded, he had always observed that, where the water was warmer than was due to the latitude, it came from the equatorial regions, and where it was cooler it came from the polar regions.

The PRESIDENT, in closing the discussion, expressed a hope that Government would undertake the proposed exploration of the Antarctic seas, which, he added, was as much for the general benefit of mankind as it was for the glory of this country.

ADDITIONAL NOTICES.

Memorandum of a Journey from Khartúm by the White Nile, Bahr el Gazal, and in the Interior of Central Africa, during the years 1857 and 1858. By JOHN PETHERICK, Esq., F.R.G.S., H. M. Consul at Khartúm.

PREPARATORY to laying before you an extract of my Journal on an excursion from Khartúm to the Equator during the years 1857 and 1858, permit me to explain that my object in visiting countries and tribes hitherto unknown, was for trade; but at the same time with the determination to break new ground, and, however humble my means, to endeavour to add to our knowledge of the Centre of Africa.

The White Nile had already been navigated by D'Arnaud, Brun-Rollet, Vaudez, and my friends De Malzac and Don Ignatio Knoblecher, beyond Belignan, to a series of cataracts as far as $3^{\circ} 30'$ N. lat. These rapids unfortunately present an impassable barrier to sailing boats; as during the increase of the Nile, when favourable northerly winds prevail, they are too shallow for navigation, while on the other hand, during the inundation, when the draught of water is sufficiently deep to allow a boat to float over the obstacles in the bed of the river, the wind blows invariably from the south, and therefore nothing but a steam-boat could attempt the ascent.

Unfortunately for private enterprise, the introduction of steam-boats, even for so worthy an object as scientific purposes, is strictly prohibited by the Viceroy.

I might here mention that Vaudez, while occupied in endeavouring to form an expedition from the neighbourhood of Belignan eastward into the interior, was, with sixteen of his followers, all Arabs from Khartúm, suddenly attacked by the negroes of the Bari tribe, and all were brutally slaughtered.

The extracts which I have the honour to read to you have been taken from the journal of my expedition in the years 1857 and 1858; but lest they might mislead some into the idea that excursions so far into that terra incognita of Central Africa may be performed with a small sacrifice of time, allow me to state that the greater part of the distance achieved has been the result of five successive journeys, during an equal number of years, some of the principal difficulties and events of which I will, in the course of my narrative, introduce to your notice.

My first expedition, in the year 1853, reached only to the extreme confines of the lake Bahr el Gazal, of which I had been the first navigator; but owing to the rank cowardice of my men, who, on seeing a strong hostile party of negroes prepared to oppose my landing, refused to proceed, I was in consequence obliged to make an immediate return to the White River and Khartúm, under feelings, to say the best, far short of complimentary to Arab boatmen, Arab soldiers, and Arabs of every other denomination, but with a full determination to try it again.

The subsequent year, by having an increased armed force distributed in two boats, I not only effected a landing, but proceeded into the interior of the country, from the extreme navigable point of the lake, and formed an establishment among the Djour tribe, by leaving twenty-five men there.

Each succeeding year, by an increase of men in my employ, and establishing new posts or halting-places, I have succeeded in reaching a country which, according to my rough calculations, I believe to be near the equator, at Mundo in the Runga or Niam-Nam tribe, said by themselves, as also by neighbouring tribes, to be cannibals; of which, however, I have had no ocular proof.

Not having had the advantage of instruments to determine latitudes by observation, I have been confined to the use of a compass, and the rough calculation of the days' journeys performed.

According to the great speed with which the negroes in these parts are accustomed to travel, and reckoning an ordinary day's journey to be eight hours' march at $3\frac{1}{4}$ miles per hour, it will amount to 28 miles per day, and deducting one-third for deviation from a straight line, will reduce a day's journey to 19 miles.

EXTRACT FROM JOURNAL.

Khartúm, Dec. 27th, 1857.—After long preparations at Khartúm, I embarked at 4 P.M. in a large "dahabyeh" with three latine sails, a crew of twenty sailors, forty armed Arabs as a guard, and three dinkas, or liberated slaves, as interpreters; another boat with ten sailors and twenty armed men had preceded me as early as October, which I expected to find at the point of debarkation.

Dec. 28th.—Passed Gotaena, a small village on the east bank, where, by irrigation with the ordinary Egyptian water-wheel, called sakyeh, a little land is cultivated during the winter months only by the Arab population, assisted by slave labour, the produce of which is wheat.

Dec. 29th.—We arrived at Wallad Shellai at about 9 A.M. The country, with the exception of two islands on which wheat is cultivated, is on both sides generally sandy. In some places, stretching up into the interior, the soil is argillaceous, and consequently richer, supporting large herds of cattle, goats, and sheep, belonging to the Hassanyeh, a tribe of nomade Arabs inhabiting both sides of the river. The Hassanyeh, in stature and beauty, particularly the females, are superior to any other Arab tribe with which I have met. Their habits are certainly most peculiar, for they consider the marriage-tie binding but for four days in every week, namely, from Monday to Thursday inclusive, while during the remaining three, both husband and wife are independent of each other, and "sans reproche."

Dec. 30th.—A group of mountains of volcanic origin, Jebel Araschkol, west of the river, and some six miles distant, was in our rear, as also Dabassi, one of the last of a group of cultivated islands appertaining to the Egyptian dependencies. At sunset we were at Eleis, a small village on the eastern bank, and the last of the Egyptian settlements on the White River, being about $13\frac{1}{2}^{\circ}$ N. lat.

Dec. 31st.—The country on both sides uninhabited; the soil gravelly and poor, but the banks well studded with trees of the mimosa tribe.

Jan. 1st, 1858.—Both banks still continue thickly wooded with very fine mimosa, the soil rich. In the afternoon passed between islands also magnificently wooded, all with the same kind of tree as described; among which the common small blue monkey abounded. One of these islands was inhabited by a few Shillúk fishermen.

Jan. 2nd, 3rd, and 4th.—No settled habitations on either side of the river. The Dinka negro tribe inhabit the interior, east of the river, and in summer only, when the water is scarce, approach the river with their herds of cattle and flocks of sheep.

The Selaem Bagara nomade Arab tribes inhabit, during the summer months, the western side of the river, and obtain a livelihood from the proceeds of their large herds of cattle, elephant-hunting, and by pillaging the Dinka negro tribe, carrying off their children into slavery, whom they sell to the neighbouring hill-tribes to the west, and to the Arab tribes bordering on Kordofan.

Jan. 5th.—At 7 A.M. arrived at Kaka, a large village of the Shillúks, about half a mile from the western bank. There is a good market here, well attended by the Selaem Arabs, who bring yarn and a coarse cloth for sale. The negroes offer bullocks, sheep, goats, fowls, excellent capons, maize, millet, cotton, sezame, ground-nuts, &c., in exchange for glass-beads, which the Arab women will also readily accept for milk, butter, eggs, &c. Very neat small coloured mats are likewise manufactured and sold by the negroes, who, while bartering with us, were kept in order by some of the officials of the king, whose residence is at Daenáb, a few miles south of this.

The Shillúks compose one of the largest tribes bordering on the river; their territory extending nearly two degrees southward, and fully as far north, although in the latter direction they have no permanent settlement.

The Dinka tribe, their deadly enemy, occupies the eastern Nile bank, but are exclusively nomadic in their habits. Not so the Shillúks, who inhabit large villages, wherein their well-made conical huts of reeds are crowded close together, and present from the river a picturesque appearance. Their language is a vernacular, common to both of these tribes. The Shillúks are the best governed of any tribe I have seen. Their king exercises a strict authority over them, and inflicts severe punishments for offences. He does not go abroad, and when approached in his hut, it must be on the knees, as no person dares stand erect in his presence. He is addressed through his officials in attendance, and his answers are also conveyed through them.

Both the Shillúk and Dinka tribe extract the lower front teeth from children of both sexes, when at the ages of eight or nine, but circumcision is not practised.

I have never been able to learn that either of the tribes entertained any definite idea upon the subject of religion. The only individual at all resembling a priest is the rain-maker, who is supposed to enjoy supernatural powers. He is only applied to in times of extreme drought, and so little is he respected that, if he fails to produce the desired rain, he is ill-treated, beaten, and in danger of his life, which he is fortunate in preserving by concealment in the bush until after a heavy fall of rain.

Having purchased a few sheep, fowls, eggs, &c., at 10 A.M. we were again under sail, and in the evening were passing the large island of Daenáb. The western side of the river is thickly inhabited, village after village appearing in quick succession, and, in many instances, but five minutes' walk apparently between them. Among these villages is that of Gova, under which, at 4 P.M., we made fast, when, long before we approached the shore, the chief, Dood, with a crowd of aborigines, men, women, and children, was waiting to receive me.

I had employed Dood to purchase ivory for me on several occasions during the intervals of my expeditions, and had always found him a good friend and trustworthy. On this occasion he was more than usually glad to see me, and, finding that his labours in my behalf had been crowned with more than ordinary success, I intimated to him, that if he would come down quietly the next morning, with his sons only in attendance upon him, I would make him a suitable present, and add a trifle to each of his sons; but that just then I could not do so, on account of the great number of attendants and idlers in his company, all of whom would expect to participate more or less in the gifts he would receive.

Jan. 7th.—Before sunrise Dood, with a crowd of men and striplings behind him, with their inseparable accompaniments of clubs and lances, were sitting on the bank of the river, at a short distance from the boat, waiting my appearance on deck; upon which a rush was made at me, with cries of "the Benj, the Benj" (the chief, the chief), and salutations too numerous to mention. As soon as the vociferations had subsided, Dood, disembarassing his mouth with

some difficulty of a quid of tobacco, the size of a small orange, seated himself near me on the deck, and motioned me condescendingly to a seat beside him. On inquiry what he meant by bringing with him so many men, most of whom I had never recollected to have before seen, he answered, "True, you have not yet seen the whole of my family; but, owing to your having promised to give each of my sons something on quitting you last evening, I sent to the Kraals; and here before you are all my fighting sons;" and, with the pride of a father, told me that he could depend upon them in any emergency, as his neighbours on the opposite side of the river, the Dinka, could certify. Although knowing something of negro families, I was still not a little surprised to find that his valiant progeny amounted to forty fine grown up young men and hearty striplings. Upon congratulating him, "Yes," he replied, "I did not like to bring the girls and little boys, as it would look as if I wished to impose upon your generosity." "What!" I exclaimed, "more little boys! and how many girls?—what may be the number of your wives and family?" "Well," said he, "I have divorced a good many wives; they get old, you know; I have only now ten and five, making fifteen!" But when he came to count the number of his children, he was obliged to have recourse to a reed, which, breaking up into small pieces, he said, "I never take notice of babies, as they may die in the rearing; women are so foolish about children, and I never care for them until they are able to lay a snare and take care of themselves." Then, as a negro cannot count beyond ten, he began calling over a string of names; and when he arrived at the end of his arithmetic, placed a piece of reed on the deck before him, recommencing another piece of reed, equivalent to a second ten, and so on, until he had counted over and marked the whole of the males; after which he dotted down the female members of his happy family; the sum total of which, leaving out babies and children unable to care for themselves, according to our numerics, amounted to fifty-three boys and twenty girls, which on inquiry I found to be correct. Having been afterwards favoured with an introduction to the ladies, each in a separate batch of huts, I had a farther opportunity of complimenting this still sturdily chief on the beauty of his youthful wives, and also on the graduated scale of the various proofs of their affection towards him. Having spent a very pleasant day with my friend at Gova, I got sail on the dahabyeh before sunset, and passed on through a level country agreeably interspersed with trees. The bifurcated palm and another kind of tall palm, called by the Arabs "delaeb," are frequent, as also is the "heglig;" the mimosa on the other hand is becoming rare.

At 7 P.M. passed the mouth of the Sobat, where it is about 100 yards wide, and has been navigated for a distance of perhaps 200 miles, when it is found to divide itself into three branches: the principal one, still navigable, coming from the north-east, is supposed to have its source in the Galla country; the other two branches, the one flowing from the east and the other from the south-east, are only navigable during the inundations, and supposed to have their origin among the Bari, a dark-brown, well-made race, fond of ornament and of something resembling clothing.

At 10 P.M. we passed another branch of the Nile, flowing from the south-east, scarcely half the size of the Sobat, called the Giraffe River. This also navigable stream drains the eastern Nile bank, and in every sense of the word is a branch of the White River, from which it detaches itself in the territory of the Bir tribe, at 5° N. lat. The large island between it and the White River is covered with thick bush, and is a favourite resort for herds of elephants. White antelopes, buffaloes, giraffes, and rhinoceri, afford an occasional diversion from the more exhilarating sport—at least to an ivory-trader—of elephant-shooting; and even at night, when sleep would be a relief, excitement is not wanting to drive off a few disgusting hyænas, or sometimes a lion or lioness

with her over-grown cubs, which, in spite of watch-fires, will not unfrequently intrude upon the precincts of the hunter's privacy, when often a louder roar than one would think necessary, or at least agreeable, will, in spite of themselves, operate instantan upon less experienced followers, and, without reflection, bring them with a start to their feet.

Jan. 7th and 8th.—We continued steering west, with a little northing, say from 5° to 10° , until, at 11 A.M., we arrived at a large basin, the White Nile flowing into it from the south, while we steered out of it west by 40° north. We now entered the channel of the lake, called the Bahr el Gazal, by which its surplus waters are discharged into the Nile. The current out of the lake into the White River I estimate at about a quarter of a mile per hour, the width of the channel being about 40 yards, and the depth 15 to 20 feet.

Soon after entering it, a large sheet of water overgrown with reeds, apparently dead water, is visible, stretching to the south and west, divided by a narrow tongue of land running between it and the channel we navigate, along its northern bank, which, as far as the eye can reach, is low, covered with coarse grass, and apparently uninhabited.

Jan. 9th.—At 9 A.M., two villages belonging to a very warlike tribe of negroes, the "Nouaer," on the northern bank, are the only habitations visible. This tribe inhabits also the eastern Nile bank, to a considerable extent into the interior, and carries on warfare among the neighbouring Dinka tribes, taking off their cattle and children, and spreading devastation wherever they penetrate; they are also famous elephant-hunters.

The men of this tribe plait their hair Arab-fashion, and plaster it over with a thick coat of potter's clay, which at a distance gives them the appearance of wearing helmets.

Jan. 10th.—In many places the surface of the water is covered with beautiful white lilies, of large dimensions, and beneath is a plant displaying a fine network resembling moss, the fibres of which are long and delicately interwoven, plainly visible to a considerable depth, owing to the great clearness of the water.

At sunset we were entering on an immense expanse of water, for the most part covered with reeds, about $2\frac{1}{2}$ feet above the surface, and bending with the wind, among which appeared at different points open pieces of water. This lake is the accumulation of numberless rivulets and streams, the largest of which, flowing from the south-west, is in itself a considerable river, and were it not for the density of the high and strong reeds, completely blocking up its connexion with the lake, it would be navigable for a very considerable distance into the interior.

The Bahr el Gazal may truly be called the home of the balinaeiceps and hippopotami; in such great numbers do the latter occasionally appear with their heads above the water, that one would think a passage through them impossible; and so fierce are they, that on more than one occasion I had literally to fight my way through them; even attempts at boarding were made, which only a liberal distribution of ball, discharged into their open gullets, could effectually prevent. As may be supposed, the sport was great, although the amount bagged was not as much as might be anticipated, owing to a desire of losing as little time as possible; one or two carcasses supplied the crews of my boats with soups, steaks, &c., though perhaps not exactly "à la mode."

Jan. 11th.—Continued navigating a wide open channel in the reeds against the slight current. Some clusters of trees are visible northwards, but whether on an island or on shore we could not distinguish.

Jan. 12th.—At noon view low land westward, and, in the afternoon, we are sailing up a channel a mile across, with low land on either side, where the current is stronger than heretofore.

Jan. 13th.—At 10 A.M., after following the channel above described, and winding about almost from north to south, the water again expands both east and west; but south we are approaching land, and at 11 A.M. make fast our boats at the island of Kyt, which is about two miles long, and half a mile wide, and separated from the shore by a channel of about 60 yards in width. Having now sailed five days and nights since leaving the Nile, I consider to have made good 300 miles, at the average of 60 miles per day; but owing to the tortuous course of the navigation, I should deduct three-eighths for windings, which would place the navigable extremity of this lake about 180 miles from its connexion with the White River. The width I am not prepared to judge so correctly, but am inclined to think it not to exceed one-third of that extent in its widest part.

With the means at my disposal it would be presumptuous to be positive about latitudes, but from the notes of my boat's steering, and a rough guess at distances, taking for granted D'Arnaud's statement that the mouth of the Bahr el Gazal is in $9^{\circ} 11''$ N., I believe the island of Kyt to be about 8° N. latitude.

Jan. 14th.—In company with the boat that I had sent in advance, my dahabyeh being, from former visits, well known to the natives, a large number of them came down from the interior for the purpose of conducting me to my station at the Djour, when I appointed the 17th as the day when I should require them. My sailors, glad to have ended their voyage, cleared the decks and kept up dancing to the sound of the tarbouka, and clapping their hands to the measure, until a late hour; the donation of a few bottles of arrack greatly increased the general conviviality.

Jan. 17th.—Made a start at 8 A.M., with 52 negroes as porters, of the Raik tribe, in whose territory we were, carrying glass beads, provisions in baskets, and my personal baggage on their heads, and 38 of my own men, exclusive of two Dinka interpreters, all well armed with muskets or fowling pieces.

At 11 A.M. halted at the village of Con-Quel-a-Ken (stationary or fixed), near a pool of stagnant water, which, the day being hot, both Arab and negro appeared to enjoy.

Having refreshed ourselves under the shade of some large sycamore trees, we broke up at 3 P.M., and at sunset arrived at Moi Chin (give it me in my hand), in which village we were well received by the inhabitants, who, in exchange for small black and white beads, called *akoitsh*, readily supplied us with maize, fire-wood, water, mats, and straw to sleep upon.

The chief or Benj, and some of the elders, expressed the pleasure they felt at again seeing me, by spitting on the palm of my right hand, and in my face, which compliment, to their great satisfaction, I returned with interest. At an early hour the watch-fires being lit, and guards set, the greater part of my men were soon fast asleep.

Jan. 18th.—Before sunrise we were continuing our journey, and after a march of $4\frac{1}{2}$ hours, halted at the extremity of the straggling village of Agoig (rich, nourishing). The country through which we passed was a dense wood of sycamore, tamarinds, heglig, and tullach, the latter the only tree bearing thorns, which are nearly two inches long; cacti also abound, upon which superior cochineal exist. At 3 P.M. we were again *en route*, and, half-an-hour after sunset, arrived at the village of Affook, but it being dark, the natives, according to custom, had retired to their huts, and would have nothing to do with us, so that my wearied men had no refreshment.

Jan. 19th.—Having a long march before us we broke up half-an-hour before sunrise, and after six hours' hard walking, which knocked up some of the Khartúmers, arrived at the principal village of the Awan tribe, called Faqualit (the place where the man died of thirst). The country well wooded with the same kinds of trees as before, the grass coarse, and standing from two to three feet high. The day was hot, and the men being fatigued, I bought them a

fine bullock, for nine pigeon-egg beads, for their dinner, whilst I dined on a Guinea fowl that my pot-hunter had shot.

Jan. 20th.—Refreshed by our afternoon's halt, we made an early start, and arrived at the very straggling village of Ackweng, belonging to the Ajack tribe, where, reclining under some fine sycamore trees, which afforded good shade near the wells, we were soon, for cowry-shells and glass-beads, supplied with sufficient provision for a hearty meal.

We continued our march at the usual hour, and at sunset were quartered, as was our wont, in the open air, in the last of the Ajack settlements, the village of Ogum.

Jan. 21st.—The sun found us marching through the bush, and four hours later we were entering Auel-chi (the ground covered with milk), belonging to the Neanglau. Here two negroes, Courjouck and Anoin, who had the previous year accompanied me voluntarily to Khartúm, left me to rejoin their friends, who presented me with ground-nuts, and a couple of goats, for my kindness to their relatives.

We remained with these hospitable people until 3 P.M., and at 5 crossed a small stream, about 20 yards wide and 3 feet deep—one of the tributaries of the lake—flowing north.

During the last hour several groups of negroes were hanging about inquisitively, at some distance from our line of march, apparently with a desire to approach, but of which they seemed to doubt the prudence, notwithstanding that I made signs to them and occasionally halted to encourage them to advance.

At length a tall man, wearing a large ivory armlet above his right elbow, whom I well knew, nick-named by my men "Abu-Aag" (the father of the bracelet), as one of the foremost men of the tribe, both in hunt and fight, having come within talking distance, raising high his club, invited us to bivouac near his village, and that before dusk both he and his brother would come and welcome me, provided the Benj (myself) would promise a friendly reception. I then approached him, carrying my rifle as a walking-stick, until he beckoned me to stop, and I promised him, his brother, and the whole tribe if he liked, a safe and cordial interview, but that I had nothing to offer them to "cham cham" (eat); upon which, waving his club as a token of assent, he retired. Continuing our route, a little before sunset we bivouacked near some deserted cattle-kraals within sight of the village of Angoin, the chief of the Neanglau or Bustard tribe.

We soon made ourselves comfortable, with watch-fires lit, and sentinels on duty. My men were bandying jokes about my order to light the cooking-fires, in the face of there being nothing to cook; while, in the full enjoyment of tobacco, on my carpet at a convenient distance, I could not but admire the ready wit of my ever-willing followers, as they returned out of the thick bush with loads of wood.

I was not deceived in my hopes of a supper; some half-grown and unclad sable maidens, ornamented with beads of a variety of colours tastefully strung, and worn round their necks, waists, and ankles, charily seemed to wait for an invitation before approaching too near; I went to meet them, and seeing they had fresh milk and flour, brought them to the bivouac, and consigned them to the caterer, who had, according to custom, invitingly displayed on a dressed antelope-hide, his varieties of the so highly prized beads and cowry-shells.

My pretty guests had no sooner concluded a rather hasty barter than they retired, laughing heartily at having done us out of costly ornaments for such common-place things as milk and flour; when a still larger party of matrons, and their full-grown daughters, the former for love of gain, the latter with greater desire for ornament than dress, of which they exhibited the greatest possible independence, encouraged by the success of their young friends, who

had been sent in advance to reconnoitre, now made their appearance with larger quantities of provender of various descriptions, which my sharpest men greeted with hearty welcome.

This tribe, having raised among their neighbours and themselves fully 6000 men, fought me last year, and as I had no proof of what their intentions might now be towards me, all was not "couleur de rose." One half of my men, apparently thoughtless of treachery, were lying in careless positions with their arms, while the remainder of the Khartúmers were feeding bonfires, hewing wood, and performing the manifold services connected with the culinary department. The Raik, porter-negroes, squatted round the watch-fires, and although an occasional shrill laugh was heard, they unmistakably expected the promised visit of the chief and his renowned brother, but whether it would go off peaceably, or we were to repel an attack, I rather felt than heard asked, and responded to in whispers.

A distant whistle was now heard, which was responded to by the departure of all the women, even of those who had still articles unsold; and in two minutes the loud hum and merry laugh gave way to silence. After a short suspense a strange voice called for Abdullah, an invaluable old negro interpreter of my party, and asked leave to approach, which, on being complied with, the chief and his brother stepped from out of the surrounding darkness into the light of our watch-fires, followed by a score or so of men leading a bullock. I rose and led him to a seat near my couch, which, however, he rather evaded, casting a searching look all round; when reassured, and invited by Abu-Aag's easy manner, they seated themselves in a semi-circle before me, carefully depositing their clubs and lances on the ground beside them, within easy grasp of each man's right hand.

After an exchange of formal greeting, with perhaps a little more of etiquette than candour, Abu-Aag, in a frank manly way, said, "As a shower is succeeded by sunshine, so does peace follow war. The chief of the mighty Neanglau having fought you, now offers this bullock as a token of the peace, which he means to propose to the great White Chief when he arrives at his head-quarters among the Djour." My reply, "*Afwat*" (good), when said with a certain intonation, conveying the meaning of a whole sentence of approbation, charmed both guests and followers, who, in as short a time as it takes to relate it, had the poor bullock struggling under the knife.

Restraint had now been thrown off between my guests and myself, for although they would not join in the meal, the materials for which they had so bountifully supplied, they willingly joined in the general good humour, which a liberal allowance of "*man*" (a thick fluid of uninviting colour, but better taste, which may be translated into beer, although in appearance resembling barm) now began to produce in all parts of the camp; and mixing with the Arabs, several of whom they recognized, partook freely of the muddy beverage, until supper being announced, they withdrew, well pleased with the happy termination to the interview.

Jan. 22nd.—We were up and stirring with the sun, having the prospect of a five hours' march before us to reach my station at the Djour. We struck out lustily, following a winding pathway, which soon brought us into thick bush, and led us now and then across highly picturesque glades, studded with fine trees, the "tout ensemble," of which forcibly reminded me of many a noble park at home. Here we disturbed herds of giraffes and antelopes, the former browsing on the young shoots of a species of acacia, while the latter were attracted by some still green blades of grass, protected by the shade of thick bushes from the withering rays of the sun. Decoyed by the prospect of sport so alluring I succeeded in shooting a giraffe, which my delighted negroes, scorning the operation of skinning, soon reduced into portable pieces for the noonday meal.

The huts of the village still threw their shadows westward as we entered Coetchangia (where the panther was killed), in which was my station, where we were received with a volley from my delighted garrison, and shouts of joy from the aborigines both old and young. Among the first to bespatter me with his endearments was the old chief Akon Dit (Dit, a term of respect, as excellency is prefixed in Europe, and Akon, elephant—the old man having been an intrepid and successful hunter). So many were the welcomes inflicted upon me by my friends, to whom I had become endeared by the profits of trade, sundry gifts, and the recollection of many a carcass of buffalo and elephant, which had fallen to their lot, the proceeds of my rifle, that I felt myself blinded, and my face streaming from the effects of their kindness, which, however flattering to my vanity, I was but too glad to curtail by a more hasty than dignified retreat into my hut.

The style of dress of the young and unmarried of my lady visitors I have already described; the married ones wear hides of antelope and sheep-skins, two of which are worn attached to the waist; one in front, and the other behind, extending to near the ankles; the edges of the front one are neatly bordered with variously-coloured beads, while small iron rings and bells of their own manufacture, form the ornaments of that behind.

The tribes through which I have hitherto conducted you from the lake are strictly pastoral, possessing large herds of cattle, and less numerous flocks of sheep and goats, upon which they mainly depend for support, rather than on agriculture, which, despising as an unmanly occupation, they leave entirely to the females, and is confined to the cultivation of small quantities of maize or millet, cotton of good staple, ground-nuts, gourds, and yams. Their field is a small patch of ground, in the immediate vicinity of their huts, which, unlike the Shilluks, are placed at considerable distances from those of their neighbours, each group of which appertaining to the same family, are defended by strong and high palisades for their protection against wild beasts. Their sheep and goats afford them neither wool nor milk, and dependent entirely upon the produce of their cows and the chase for nourishment, sometimes, from a deficiency of grain, many have died of starvation; and frequently while shooting in the bush have I beheld skeletons of children, in twos and threes, who have dropped and died from want while in search of gums or berries to satisfy their hunger.

We have now entered into a latitude, according to my calculation about 8° N., where the tsetse fly abound, and where consequently cattle can no longer exist; therefore the Djour tribe, as well as those in more southern latitudes, are agricultural in their habits.

Iron ore, a rich red oxide, is found here, which the Djour, who are capital smiths, turn to account by the manufacture of lances and hoes, which they exchange with their pastoral neighbours for fat oxen and beads.

The Djour are a small, powerless, and consequently peaceable tribe, who having tasted the profits of their industry—in the manufacture and sale of iron implements of war and husbandry—entered eagerly into the spirit of the ivory trade, and would collect and purchase tusks wherever they heard of them within their reach, to retail to me at a small advantage.

Although my advance thus far may appear from these extracts to have been smooth sailing, yet from the plundering and cut-throat propensities of my present friends—the Dinkas—it has during preceding years called forth all my energy and nerve, not only to make good my footing, but to insure the lives of myself and followers.

While on my first journey into the interior, in the year 1854, I pursued a more westerly route, with thirty-five Arabs, and ninety negro followers of the Raik tribe, as porters; and after having entered the Wajkoing tribe I was

placed in as awkward a fix as any man with an ordinary love of excitement could desire.

The savages, during my absence shooting in the bush, had, by dint of hard threats, induced my porter-negroes to abscond, and by their refusal to provide me with substitutes, hoped to compel me to abandon my baggage, which offered a prize far exceeding their hopes of gain by legitimate trade or labour. Disappointed in their expectations, collecting by hundreds, they used threats and menaces, calling us frequently to arms during many a weary day and watchful night. After six weeks of patient and trying endurance, a detachment of my men induced the Waj chief Maween, ever after my staunch friend, to bring one hundred men under their escort to my relief, and conducting me through his own territory, eventually left me with the Djour, among whom I succeeded in engaging porters to return to my boats.

In expectation of concluding a peace with the chiefs of the neighbouring tribes, the most formidable of whom was Angoin of the Neanglau, I may as well relate what had led to the rupture between us, as it will serve to throw a light on the slight estimation in which human life is held by these tribes.

My success in the ivory trade had created a jealousy among the mercantile community at Khartúm, and had induced several parties to get up expeditions similar to my own, and, to my great annoyance, follow my footsteps, rather than break new and dangerous ground. One of these parties, on two occasions while on the march, had been fallen upon by the negroes and plundered.

In the first instance, added to the loss of their property, eight out of twenty-four of their men had been murdered by the Ajack tribe, a fate which, no doubt, the entire party would have suffered, had it not been for the providential and unexpected arrival of another Arab company in time to extricate them. A few days after this occurrence, and without any knowledge of it, a second and smaller detachment of nine men, in the service of the same person, were sent from their temporary establishment to their boat on the lake, and were all brutally murdered by the Neanglau, at a distance of about 20 miles from my head quarters.

These facts were for a considerable time kept secret from me, as it was determined, in consequence of the easy prey the last party had proved, to fall upon us, and secure to themselves a more valuable booty. The Djour would not join the neighbouring Dinkas, who comprised the entire negro population, composed of six tribes, between me and the lake, and, in order to take a neutral part, decamped during the night, without any warning, from their huts into the bush.

My first object was to afford protection to the unfortunate Arab merchant, the principal of the murdered men, and his ten ill-armed remaining followers, by taking them into my camp, with whom and my own men—at the time but thirteen in number, and these reduced by illness to only six able men—we set about barricading and strengthening our position, where we stood a six weeks' siege.

At last my men, consisting of two detachments of thirty-five each, although among a far distant tribe, the Dôr, heard of my situation, and, joining, came to my relief. I now no longer feared an attack by day or night, which had often been threatened; but a friendly Djour named Pfing, a valued companion in frequent exploits with elephants, under cover of the night, informed me that Meckwen Dit, the chief of the Neanglau, and leader of the tribes, had determined not to expose himself or men to the effect of our firearms in the open plain round the village, but to occupy in preference the thick bush, through which we should be obliged to pass on the way to regain our boats.

Having secured the safety of a large quantity of ivory and valuables among my southern friends the Dôr tribe, the rainy season being at hand I decided,

at whatever risk, to commence my return. With the certainty of an attack from vastly superior numbers, in a disadvantageous position, I determined to out-manceuvre my enemy; and knowing the tribes to prize cattle above anything on earth, decided on a counter-attack upon their Kraals, which, in expectation of encountering me on my line of march, I conjectured might possibly be ill-defended.

Starting with sixty of the best armed of my Khartúmers, having given Meckwen Dit and his Dinkas in the bush a wide berth during the night, at sunrise on the following morning we were, as I had anticipated, quickly in possession of their Kraals; the few negroes in charge, after a short resistance, abandoned their herds to us. We were yet busy in detaching the cattle from their tethers, with which each was secured by fore and hind legs to pegs in the ground, when the old Neanglau chief, at the head of a large party of negroes, yelling and flying rather than running, assailed us with volleys of clubs and lances.

The first to drop from the fire of my exasperated followers was Meckwen Dit, the author of the preceding murders, and the zealous advocate for our own destruction; around him fell also several of his bravest warriors, and as impetuous as the onslaught had been was their flight precipitate.

Our booty consisted of a herd of cattle and some sheep, several guns and pistols, which had belonged to the unfortunate Arab victims, and sundry prisoners, whose restoration I looked upon as a means of re-establishing peaceable, if not friendly relations between us. In this I was not disappointed. The discomfited Dinkas never having contemplated a reprisal by me so mortifying to them as the loss of their cattle, now feared a repetition of a similar attack on other Kraals, to prevent which they engaged the good services of my old Djour chiefs, Akon Dit and Píng, to negotiate a return to our former peaceful alliance, which by their guarantee I was but too willing to embrace, and thus rid myself of the prisoners, who were all given up, my object in visiting the country being a peaceful one—namely, trade.

The cattle went to reward my friend Maween, the Waj chief, for his assistance in helping me out of my fix among the Wajkoing.

While journeying homeward towards the lake, a few days after the above affair, and proceeding through the Ajack tribe, they, hoping to retrieve their fortunes, while acting in concert with the Neanglau, attacked me, and were again defeated.

Jan. 24th.—The tribes now seemed to deplore with myself the melancholy consequences of their barbarous assaults, and I had this day the pleasure of receiving their chiefs—six in number—accompanied by several heads of neutral tribes, among whom was my old friend of the Waj, to unite in assurances of their peaceful intentions for the future. I am happy to say that, under the conviction of the advantages which peaceful traffic would confer on them, and the futility of opposing their crude weapons to firearms, I have ever since enjoyed uninterrupted respect from, and cordiality with, the Dinka tribes.

Jan. 25th.—I broke up, with forty of my own men and fifty Djour negroes, soon after sunrise, and passing into the territories of the Dôr at noon, when we halted an hour in thick bush, through which the most of our route lay, we, after ten hours' march, arrived in the evening at the village of Djau, so called after the chief.

Finding my journal might extend to impracticable dimensions, I shall curtail it, by merely giving the names of the villages at which we passed the nights whilst traversing the Dôr country southwards.

Henceforth the negroes will not proceed more than one day's journey with me, so that I have to get a new set of porters every morning, and lose all connexion between us and our station and boats.

Jan. 26th.—My old friend Djau having prepared our porters, we were early on the road, and during our journey to the frontier of the country, quartered at the following villages, viz. :—Kurkur, Maeha, Mura, Umbura, Modocunga, Miha, Nearhé, Gutu, Mungela, Ombelambé, Lungo, and Umbotea, which, after several halts, we reached on the 19th of February, after sixteen days' march. Between Djau and Maeha six small streams, and near Gutu a large navigable river, are crossed, all flowing from the south-east in a north-westerly direction towards the lake, which they feed.

The country, from the lake up to the Djour, is exceedingly flat, but in the Dôr country it first becomes undulating, where the new red sandstone crops out on the sides of several heights and ravines until near Gutu, Mungela, and Ombelambé, bold red granite mountains, with exceedingly large mica, rise perhaps 2000 feet above the level of the country.

Generally the country is thick bush, but cleared in the neighbourhood of the villages, and in a high state of cultivation.

The Dôr are not so tall as the Dinka tribes generally, but thick-set and strongly made. They speak a totally different language, and their colour is dark-brown. Unlike the Dinka, they do not extract the front lower teeth, nor do they construct their villages similarly. Their huts are larger, made of bamboo, and nearer to each other, without palisades.

As a general rule, the centre of each village consists of a circle of huts, constructed around the largest tree in the neighbourhood, upon which the war-trophies—such as skulls, &c.—are suspended; underneath is a large tom-tom, formed of the hollowed trunk of a tree, and between it and the huts a large circular space forms the dancing-ground.

Their arms consist of bows and arrows, clubs and lances, which both Dôr and Djour, who are excellent smiths, manufacture exceedingly well.

The women perforate the under lip, in which they wear a piece of round wood for ornament. Young girls introduce a piece of wood about the size of a sixpence, whilst full-grown women wear pieces as large as a florin.

Married women, in lieu of aprons, wear bunches of green leaves suspended by a belt to the waist, hung down to the ankles, which latter are ornamented with a solid iron ring, each fully one inch in diameter. Whilst dancing, these rings are struck together, and produce an agreeable sound.

Feb. 23rd.—After a few days' rest, and some trouble in procuring an interpreter, we traversed a hilly and rather dreary country, and, after a forced march of ten hours, we arrived at Baer, also called the Mundo country. This tribe resemble in colour and habits the Djour, from whom perhaps they are descended, as their languages much resemble each other. They are also good smiths.

Occupying a hilly and almost mountainous but narrow strip of country between two powerful tribes, they are hunted by the Niam-Nam, their southern neighbours, and when taken become their slaves.

Their villages are either on the summits of the hills or at the foot of some rock difficult of access, to which they fly when attacked by the Niam-Nam, whom they say are cannibals.

We remained with this tribe three days, having with difficulty found a dozen men to carry on my beads, baggage, &c.

I should have said that I had left the greater part of my merchandise at Lungo among the Dôr, in order to be less encumbered.

**Feb. 24th.*—At sunrise recommenced our journey, and passing through some fine ravines, gradually came out upon a fine undulating country, in parts beautifully wooded. We halted under the shade of some very large trees, the leaf of which much resembles that of the fig-tree, for an hour at noon, and at 4 p.m. entered the large village called Mundo, in the Runga or Niam-Nam tribe.

It was some time before I could feel comfortable; the sight of my white skin, added to a quantity of cowry-shell and glass-beads in my possession, having excited great curiosity, and a strong desire to become possessed of both our persons and goods, the former, as explained to me through a string of four interpreters, for the purpose of feasting on.

The old chief Dimu with some difficulty managed to persuade the younger men that we might probably be difficult of digestion, being armed with weapons which they had neither seen nor heard; and being told, after having presented the old man with a few beads of different kinds, that they might have beads or cowries in exchange for provisions and elephants' tusks, we were very soon offered every kind of food they possessed, consisting of sweet potatoes, beans of different kinds, ground-nuts, maize, millet, vegetable-butter, dried meats of the antelope and buffalo, and, as a great luxury, the hind-quarters of a dog, unskinned and just killed.

Others ran to the bush in quest of tusks, which for the greater part proved valueless, owing to the length of time they had been exposed to decomposition by fire and rain.

The greater part of the men present, consisting of some hundreds, were slaves, of which the Runga are large proprietors, and entertain them for the purpose of cultivating their lands, hunting, and performing every kind of work; it being considered a sign of poverty for a native Niam-Nam to occupy himself with anything but the chase and war.

The country is well cultivated, and the villages well constructed of bamboo.

The Niam-Nam are of ordinary stature, and a dark-brown colour. Their arms consist of spears, a kind of curved sword, and an iron boomerang, two of which they attach to the handle of a large oblong shield, constructed of interwoven and stained reeds of the palm-leaf. Both men and women wear leather sandals, and a kind of cloth, woven from the fibres of the bark of trees, around the loins. The date-palm tree and the banana grow wild. The indiarubber tree, as also the vegetable-butter tree, exist in abundance.

The rains commence in the month of February, and last until the latter end of October.

The territory of this tribe, I was informed, extended ten days' journey south, where a deep and wide river, flowing west, was said to be its frontier.

Having marched twenty-five days from the shore of the lake, at 19 direct miles per day, will amount to 475 miles, which brings me, I imagine, near the Equator.

What with the purchase of several tusks and our daily provisions, my stock of beads had seriously diminished, and I obtained the promise of a score of negroes to conduct me back to Lungo, in the Dôr country, to my dépôt.

It was not without a sincere promise to return and bring more beads that, at sunrise, I was enabled to leave the hospitable old chief Dimu and my Niam-Nam friends, whose salutations were not so marked as with the Dinkas, but who confined their adieus to an ordinary squeeze of the hand.

Having in due time returned to Lungo, I left twenty-two of my men there well supplied with articles for carrying on trade with the Dôr, Mundo, and Niam-Nam tribes, until my return the following year.

Should they fall short of beads, or from other causes be unable to maintain their position, they were directed to fall back on my principal station at the Djour.

On my way up, having occasionally purchased tusks, and invariably, to save expense of carriage, left them in charge of the chiefs, I necessarily returned through the same villages, and in due course of time arrived, on the 15th of May, at Khartûm.

*Agreement between Consul Petherick and the Royal Geographical Society,
Feb. 4th, 1861.*

1. "Consul Petherick undertakes, in consideration of the receipt of 1000*l.* towards the Expedition up the Nile, to place two well-armed boats, during November, 1861, at Gondokoro, with a sufficient stock of grain to ensure to Captain Speke and his party the means of subsistence upon their arrival at that place."

2. "If Captain Speke shall not arrive in November, 1861, that Consul Petherick shall proceed with an armed party southwards towards Lake Nyanza to meet him."

3. "If Captain Speke shall arrive at Gondokoro before June, 1862, Consul Petherick promises to assist Captain Speke in making any explorations which Captain Speke may deem desirable."

4. "It being farther understood that in the event of Captain Speke not having arrived by that time at Gondokoro, Consul Petherick shall not be bound to remain beyond June, 1862."

*Instructions for Consul Petherick's proposed Expedition up the White Nile
in Aid of Captains Speke and Grant, Feb. 8th, 1861.*

THE President and Council of the Royal Geographical Society having ascertained that the amount of subscriptions will not be sufficient to enable you to remain two years to the southward of Gondokoro, and thus to carry out your proposition in full, proceed now to give you instructions whereby the great object of their desire—the rendering assistance to the expedition under Captains Speke and Grant—can be best accomplished with the means at their disposal.

By leaving England in March, you will be enabled to reach Khartúm in time to equip two boats with a supply of provisions sufficient for your own and Captain Speke's party until July, 1862. With these you will proceed to Gondokoro, where it is very desirable you should arrive early in the month of October; that is to say, as soon as possible after the cessation of the rains. You will then, in the event of Captain Speke not having arrived, leave a trustworthy person with a sufficient force in charge of the boats, the maintenance of these until June, 1862, at Gondokoro, being of primary importance.

The next object the President and Council have in view is, that you should proceed in the direction of Lake Nyanza, with a view of succouring Captain Speke, and bringing him and his party in safety to the *dépôt* at Gondokoro.

The President and Council do not attempt to lay down any limit to this exploration, but, fully trusting in your known zeal and energy, feel assured that you will do all in your power to effect the above-mentioned object, without serious risk to the lives of the party under your command.

Should the junction with Captain Speke be effected, which there is every reason to believe it will be, previous to June, 1862, you will consult with him as to the best means of employing the period which will elapse before the change of the monsoon will permit you to descend the Nile, in extending our knowledge of the adjoining region.

In entrusting you with the sum which has been subscribed for this purpose, the President and Council, considering themselves accountable to the subscribers for its proper expenditure, will require an account of its disbursement. If circumstances should prevent your meeting with Captain Speke's expedition, they consider that you are entirely relieved from the responsibility of remaining yourself or detaining the boats longer than June, 1862, at Gondokoro.

The President and Council desire to impress upon you the necessity of

obtaining as frequently as possible astronomical observations for the ascertainment of your geographical position, and that you forward, as often as opportunity offers, copies of your journal to the Secretary of this Society.

A list of instruments, together with instructions respecting their use, and notices of such phenomena as it is likely you will have an opportunity of observing, is herewith appended, to which also are added *Manuals* on Ethnology, Botany, and Zoology; to each of which sciences, as well as Geology, you will have an opportunity of adding much new information. In addition to the 'Hints for Travellers,' published by this Society, particular instructions relative to the peculiar character of the great river you are about to explore have been prepared, and which, it is to be hoped, will assist you in making observations which will throw much light on the geography of this region.*

The President and Council take this opportunity of expressing their admiration of the spirit of enterprise which has induced you at great personal risk, and possibly considerable pecuniary loss, to undertake the charge of this expedition; and they hope, under God's providence, you may not only succeed in affording succour to the Zanzibar expedition at a period when it will be most in need of it, but that you will succeed in opening a new field to the civilizing influences of commerce.

* *List of Instruments, Books, &c., supplied to Consul Petherick by the Society.*

Quintant, by Cary; Sextant, by Casella; Telescope, with tripod stand, by Troughton and Simms; Prismatic Compass, by Troughton and Simms; Artificial Horizon, by Troughton and Simms; Mathematical Instruments, pocket-case, by Cary; Boiling-water Apparatus, complete, by Casella; Chronometer, by Barraud and Lund; Parallel Ruler, 12-inch, by Cary; Protractor, Ivory, 6-inch, by Cary. Baper's Navigation; Nautical Almanacs, 1861-2; Blank forms for computing, viz., 3 Field-books; 2 Register 4 Days' work; 3 Latitude by Merid. Alt.; 2 Latitude by Circum. M. Alt.; 2 Time, and 3 Pocket Books; 29 Memoranda, &c.

CONSUL PETHERICK'S *Expedition from KHARTÚM on the NILE, to co-operate with that under CAPTAINS SPEKE and GRANT from Zanzibar on the East Coast.*

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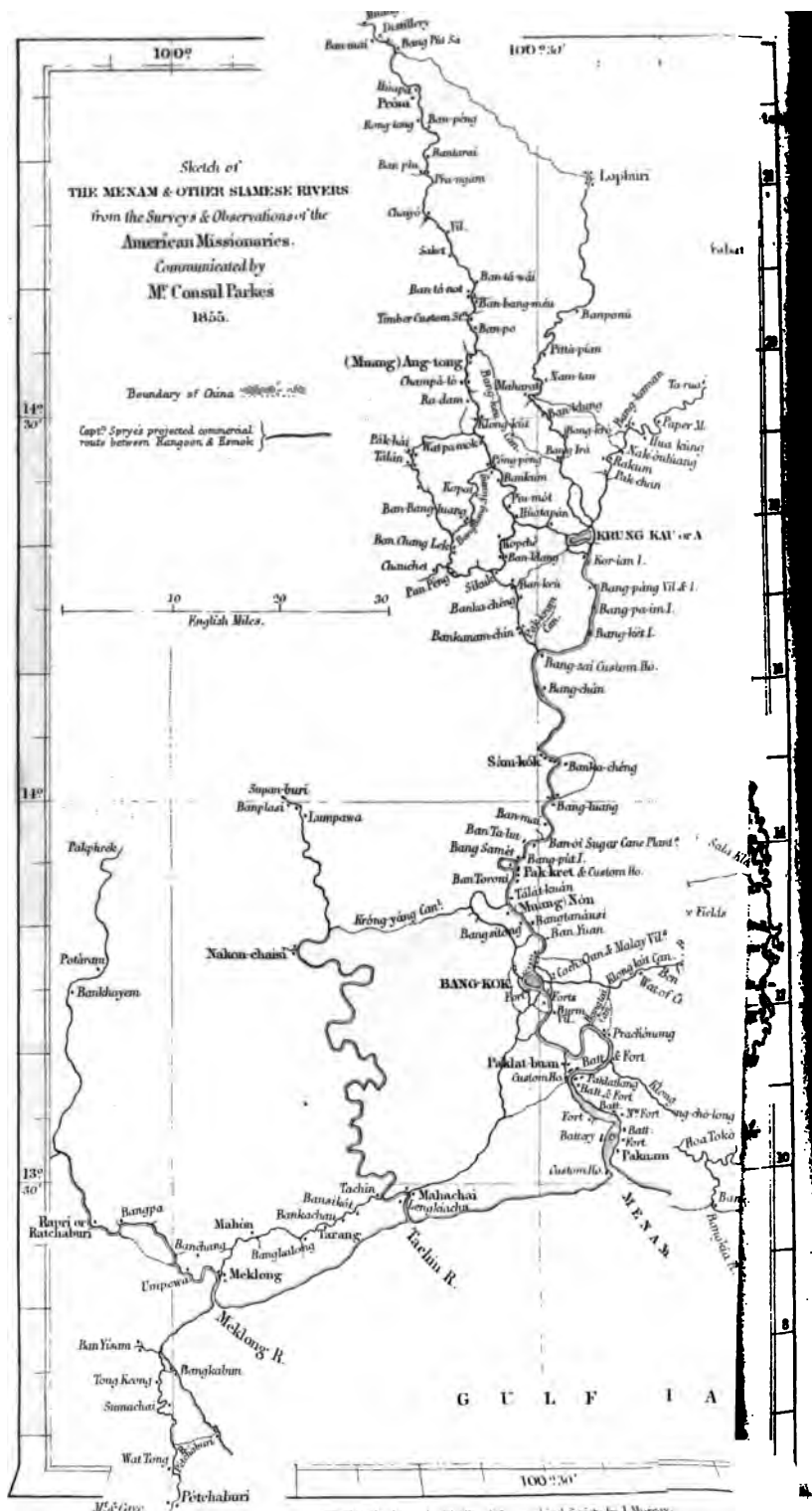
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NORTON SHAW.





PROCEEDINGS

OF

ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

SESSION 1860-61.

Monday, December 10th, 1860.

MR. I. MURCHISON, VICE-PRESIDENT, in the Chair.

Members.—Thomas Begbie; J. Rodney Croskey; and J. Irwine, Esqrs., were presented upon their election.

—Dr. J. Cornwell, PH. DR.; Lieut.-Colonel Lothian Ross; Sir Jamsetjee Jejeebhoy, Bart., of Bombay; Dr. E. J. R.; and A. M. à Beckett; W. R. Looker; J. A. Mann; and W. Spencer Stanhope, Esqrs., were elected Fellows.

—The following were among the more important accessions to the Library and Map Rooms since the last meeting:—*Physical Geography of the Sea;* 'Den sidste Franklin-
ed Fox, ved Carl Petersen;' Hope's 'Canadian Settler's
&c.

*s.—Views of Rangoon, photographs of various parts of the
Dr. M'Cosh, M.D.; and tracings of the Irawaddi, Sal-
her rivers, by Captain R. Sprye, were exhibited.*

PRESENT.—The CHAIRMAN read a letter from Dr. Baikie, (of the
Niger Expedition), dated Bida, Nùpe, 24th April, announcing
his arrival at the above place, hitherto unvisited, and stating
that he has been everywhere well received, and that he had found
the country exceedingly mountainous, being a range from 10 to 12
miles long, and 1200 to 1500 feet high, and well cultivated, the
products consisting chiefly of palm-tree and cotton: the latter Dr.
Baikie states to be

read were:—

*tion with the South-West Provinces of China from Rangoon to
Pegu. By Captain R. SPRYE, and R. H. F. SPRYE, Esq.*

*s substantially a description of Yu-nan and Se-chuen, the
vinces of China that lie nearest to Pegu. Captain and Mr. Sprye
ve submitted it to the Society, previous to a promised*

description of their proposed telegraphic and commercial route from Pegu to China via Esmok. They desire to specify the commercial products of that moiety of China to which their road would in the first instance lead, and upon whose amount and value its importance would principally depend.

The information they have collected is deduced from numerous and scattered sources. They begin with Marco Polo, and proceed with Du Halde and Le Comte. They then give copious extracts from most of the modern travellers, writers, and compilers of works relating to China. The Abbé Huc is, however, the only one of these later authorities who ever visited the provinces in question. Even he did not traverse Yu-nan; it was at Se-chuen where, leaving behind him the dreary uplands of Tibet, he descended into the fertile plains and the high civilization of China.

Lastly, an important contribution to our knowledge of the neighbourhood of Esmok is extracted from the unpublished reports of Dr. Richardson and, the now, Colonel McLeod who were despatched by the Government of India, between the first and second Burmese wars, on unsuccessful missions to open a line of commerce from Moelmyen across the lofty Tanon-Tong-Ghee range, which runs north and south between the Tenasserim provinces and the Siamese Shan States of Labong, Lagong, and Zimmai. Yet the impracticability of that long and difficult route does not compromise the prospects of the present project, for considerable changes have occurred since the date of their missions: England by the acquisition of Pegu and Martaban having pushed her frontier one half nearer Esmok and within reach of the Chinese caravans proceeding from that place. Both Captain and Mr. Sprye are personally well acquainted with our Pegu, Martaban, and Tenasserim provinces; and have, for years, collected all procurable information of the countries between them and China.

The numerous authorities above alluded to, are mutually corroborative of the facts that there is a general resemblance between Yu-nan and Se-chuen; that Yu-nan is the richest in mineral wealth of all the provinces of China, exporting gold, copper, zinc, and various stone and marbles of high value. Also that being in part mountainous, it is intersected by lakes, large rivers, and highly fertile valleys, where nature is prolific under a tropical sun, yielding silk, sugar, &c.; and more especially that it is a tea-growing district of some celebrity, partly as the source of export of ordinary teas to Tibet, and partly as producing an exceedingly rare and precious description, at a place called Purrh, near Esmok. This latter is the most highly-priced of any that exists in China.

Esmok, the frontier city, is written Sz'mau in the Jesuits' map, and Es-mau in other maps. It is described from hearsay, in McLeod's report, as a walled town, garrisoned with from 300 to 1000 Chinese soldiers, and traversed by merchants' caravans, composed of mules, ponies, and donkeys, carrying on traffic between China, the Laos states, and the Shan States of Siam and Burma, for which last their caravans, passing through Kiang-Hung and Kiang-Tunk, cross the Salween river so far as Moni, &c. McLeod's farthest point was Kiang-Hung, about 40 miles from Esmok. It is on the right bank of the Mai-Kong or Cambodia river, which even here, at the driest time of the year—that also of McLeod's visit—was 500 feet wide, upwards of 15 feet deep, and navigated by laden vessels of various sizes.* The caravans from China cross it in ferry-boats, at fixed charges.

The paper concludes by stating that Esmok is now within 250 miles of our north-east Pegu frontier, and that the two intermediate Burmese Shan princes, the Tswabwua of Kiang-Tung (who was twice visited for several days by Colonel McLeod) and the Tsenwibwua of Kiang-Hung (where the Colonel spent seventeen days), are most desirous of the establishment of a route between British territory and China across their states and through their capitals.

The second Paper read was—

2. *On the various Lines of Overland Communication between India and China.* By DR. M'COSH, late of the Bengal Medical Staff.

FEW nations bordering upon the British dominions are less known than those inhabiting the north-east frontier of Bengal. There our territory of Assam lies in almost immediate contact with China and Ava, separated from each by a narrow belt of mountainous country, possessed by barbarous tribes of independent savages; and yet from this small, savage, and unknown country many navigable branches of the great rivers of Nankin, Cambodia, Martaban, Ava, and Assam derive their origin, offering natural highways of commerce to the great nations of Ultra-Gangetic Asia.

This belt of country, though covered with impenetrable jungle, possesses a cool climate and other conditions congenial to the con-

* At Kiang-Hung the river Mai-Kong or Cambodia is, during the rains, 1600 feet wide. Kiang-Hung is distant from the (now French) fortified city of Saigon at its mouth about 880 miles in a direct line. By the capture of that city and the recent formal annexation of the Cochin Chinese province of Saigon to the French Empire, France has secured command of all the mouths of this very important Asiatic river.

stitution of Europeans. It appears capable of being converted into one continuous garden, that should extend over hundreds of square miles, and produce cotton, silk, coffee, and sugar.

The province of Assam, which leads to it, lies between the Himalaya and some of its mountainous offshoots. It is drained and devastated by the mighty Brahmaputra, which rising thirty or forty feet in the rainy season, inundates the land and renders ordinary earthworks, such as railway embankments, impossible, while itself is little suited to navigation. For days together during a voyage upon its stream neither boat nor human habitation is to be seen; the horizon is bounded by gigantic reeds; and porpoises, turtle, and crocodiles are the chief tenants of its waters. Judging by the rate of premium exacted by the insurance offices on residents in this district, Assam is reckoned to be the most unhealthy province in British India.

Near Suddya, the old frontier station, the Brahmaputra is formed by numerous confluent, of which the Dihong and the Lohet are the principal. They issue through the wall-like range of snowy mountains that here put a limit to the valley of Assam. No less than five roads lead from this district into Tibet or China proper. They will be described in order, premising that our information is drawn from very limited sources—so much so, that no Englishman now living has ever traversed any one of them.

I. *The Pass of the Dihong*.—This river is the main tributary of the Brahmaputra, and is usually considered to be the termination of the great river of Tibet, the Tsan-pu. In this opinion Dr. McCosh does not himself coincide, on the ground of its inferior size; but the arguments he quotes, and the popular belief in favour of the identity of the rivers, are strong. Pilgrims passing by this route reach Mah-loo, the frontier town of Tibet, in sixteen days. Four days farther is a populous city, with a regular Chinese government, called Rhoshee-mah. The Dihong pass is always difficult, and impracticable except in summer. No less than five British officers have penetrated to the capital of the tribe (Abors) who live on the first part of this route. Beyond them are the Bors Abors, regular Tartars, who have never been visited by the British.

II. *The Mishmee route* is very practicable, but little commerce is likely to flow along it. It leads for a couple of days up the Lohet, to where the river ceases to be navigable, and thence by a footpath ten days farther along its banks, to a place very sacred in Hindu mythology, called Brahmakund. Great numbers of Hindu pilgrims go there for absolution. Captain Wilcox reached it with ease, though the surliness of the people beyond, caused him to return. Captain

Rowlatt made a difficult ten days' journey to Toopang, on the river Doo, during which he succeeded in traversing no greater distance than sixty miles. He met a large party of Lama people, who had crossed from Tibet, but could not get back to their homes, owing to an unexpectedly early fall of snow in the mountain-passes. They were about to spend the winter with the Mishmees, who are the go-betweens to them and Assam. The Mishmees were very friendly to Captain Rowlatt.

III. *The Phungan Pass to Manchee and China.*—This leads over the Wang-leo-bum mountain-range at an altitude of 8400 feet, through a dense jungle of oak, pine, rhododendron, and juniper. No footpath was to be seen; but the travellers Wilcox and Burlton were led by guides, who followed notches in trees, they had made in a previous journey. Venomous flies and swarms of land-leeches infested the forest. There were elephants, buffaloes, and tigers; but these gave no trouble. When they reached the Irawaddi, the travellers were surprised at the smallness of its stream, only eighty yards wide, and fordable. They could hear of no trade whatever between Manchee and China; while, to the north of them, rose a wall of lofty snow mountains, that wholly cut off communication with Tibet. However, in this district the great rivers of Nankin, Cambodia, and Martaban are in close approximation, and are probably navigable onwards to the sea. The native tribes are numerous; all are tributary to, and in dread of, Ava, and all are habitually at war with one another.

IV. *Pathkoy Pass to Bhamo on the Irawaddi, and thence to China.*—This was the route followed by the invading Burmese army, and is by far the most practicable line from Assam to China. At Bhamo it meets a great stream of Chinese commerce between that country and Burma. Caravans of thirty and forty mules or bullocks constantly arrive. About five hundred Chinese are said to come every year to Bhamo and transact business to an amount of 700,000*l*. This road was travelled in part, by Lieutenant Burnet, on his way to the north face of the Pathkoy range, where he was stopped in his attempt to penetrate to Ava, and in part by Lieutenant Hannah, who endeavoured to reach Assam from Ava, and was stopped at the south face of the Pathkoy. In both cases the natives were the obstacles. They are a wild, daring race, and once the terror of the Assamese. Although we have no British account of the Pathkoy range, it is clear that little difficulties can exist there, since the entire Burmese army succeeded in traversing it. The Chinese exports that pass Bhamo are gold and silver ingots, brass and copper vessels, mercury, arsenic, vermilion, carpets, fans, silk fabrics, spices,

rhubarb, musk, dried fruits, &c. The return cargo is cotton wool, ivory, edible birds' nests, and British woollens and calico.

V. *Route by Manipur to the Irawaddi.*—Granting the feasibility and advantage of the Bhamo and China line, it remains a question how best to reach Bhamo. The Irawaddi has all, and more than all, the disadvantages above ascribed to the Brahmaputra, and may not be thought of. However, an excellent opening exists through the mountain valley of Manipur. This was once a populous kingdom, since devastated, like Assam, by the Burmese: it was from here that the Burmese threatened a descent upon Calcutta, and originated the first Burmese war. The treaty that followed the conclusion of that war restored the Rajah of Manipur to his throne, and he is now a well-affected neighbour of British India. The climate of the land is well adapted for Europeans, being cool and healthy; the soil is admirably fitted for the tea plant. The route proposed by Dr. McCosh passes by Dacca and the line of the Barrak River to Bans-kundee; thence by land to Manipur and Monfu, on the river Ning-tee or Kyan-dwen; thence across country to Bhamo, and lastly up the Pinlang river into Yunan. A railroad is now being constructed from Calcutta to Dacca; it might be extended to Bans-kundee. There is already much intercourse between Manipur and Ava down the Ningtee. Captain Pemberton remarked, in a forcible report, on the natural advantages of Manipur as an entrepot to Bengal and Burma: he dwelt on its position, the navigable rivers that passing near it flow in many directions, the healthiness of the climate, and the favourable disposition of its ruler.

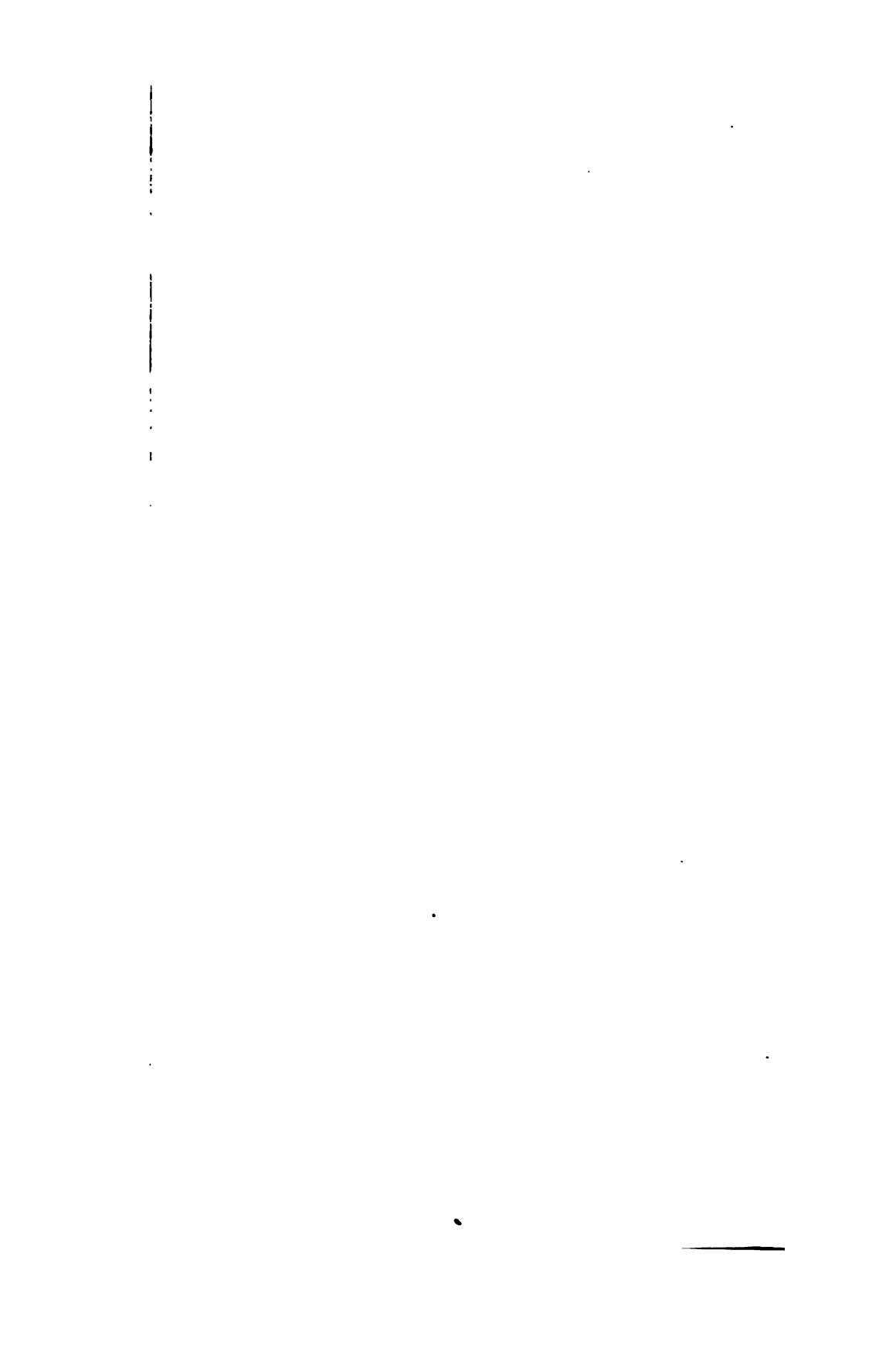
Dr. McCosh concludes by dilating on the importance of facilitating an overland commerce between India and China by opening a practicable road between them; he urges that an expedition should be despatched in order to make a thorough survey of these five passes, especially the fifth and the latter half of the fourth; and he begs the Royal Geographical Society to exert their influence with Government in furtherance of his proposal, the details of which he traces out in full in his paper.

The CHAIRMAN tendered the thanks of the Society to the authors of the papers just read, and observed that of late years the Government of this country appeared to have been too much occupied with the political concerns of India and China to pay sufficient attention to a point of such national importance as the opening of a western route between the two countries.

MR. JOHN CRAWFORD, F.R.G.S., said he had served with Captain Sprye thirty-five years ago in Ava, and had a high respect for him, but felt himself bound, nevertheless, to differ widely from him with respect to his proposed western route. He was not responsible for the sentiments attributed to him in the quotations which had been so freely used by Captain Sprye. The book from which they had been taken was not written by him, as it professed to be, but

by a clerk of his, one Mr. Peter Gordon, who had published it as a production for which he (Mr. Crawford) was jointly responsible. Yunan was at once the largest and the poorest province in China. It might be called a "great big beast." It was mountainous and barren. The province of Canton was also a poor one. Captain Sprye had said little or nothing respecting the staple trades of China, tea and silk. Yunan produced very little tea—about half the quantity consumed annually in London—and what it did grow was execrably bad. It produced no silk at all. The Chinese themselves would not live there if they could help it, though they would emigrate in large numbers to Australia and California. With regard to Esmok, he doubted the existence of such a place. First of all, it was a word of two syllables, and every one knew the Chinese could not put two syllables together. Moreover, every one in that room knew that Chinese words ended invariably either with a vowel, a nasal, or an aspirate; whereas the two syllables in Esmok ended, the one in the sibilant "s," and the other in the guttural "k." Supposing, however, that such a place existed, the district lying between it and the Rangoon territory was mountainous and most difficult of transit—muddy and malarious also in parts—and from the middle of May to the middle of October it was altogether impassable. Heavy bales of cotton would have to be divided and transported across that difficult region on the backs of donkeys or small ponies, if they could be obtained, besides being subjected to heavy import taxes and the plunderings of barbarous tribes. Under all these circumstances he believed the project to be commercially unsatisfactory, if not altogether impossible. He would as soon think of adopting it as of returning to the old middle-age process of going to India and China overland, and abandoning Vasco da Gama's discovery altogether.

SIR JOHN DAVIS, F.R.G.S., said that highly as he valued the geographical information which had been placed before the Society, he was quite at issue with the two gentlemen whose papers had been read as to the capabilities of the Yunan province. On that point he agreed with his friend Mr. Crawford. But with respect to Esmok, although he had never heard of the place before, he could not go so far as to deny its existence on account of its alleged name. The corruption to which the Chinese language was subject would account for the objections pointed out by Mr. Crawford. At the same time he believed it would be found to lie considerably within the frontier claimed by the Chinese, claiming, as they generally did, much more than they were entitled to. With regard to Du Halde, he, Sir John, placed a modified reliance upon his writings, which were chiefly compiled from the statements of the Jesuits, always grandiloquent as to China. An able and zealous French missionary who had resided thirty years at Peking had informed him of the natural obstacles to commerce and transit which would be encountered in the mountainous province of Yunan, apart from its unproductiveness. At present England enjoyed a trade with the eastern coast of China by sea, and it only required peace and quiet to make it almost illimitable. The ancients called the ocean *dissociabilis*, but it was now the best commercial highway for nations, and it appeared to him that any English merchant awake to his real interests (which, after all, in trade were the safest impulses) would never dream of preferring a land route of such a mountainous character to the sea route. At the same time he had no doubt that, should it be proved that the proposed route presented the facilities which were ascribed to it, the merchants and traders of this country, with their usual enterprise and keenness, would avail themselves of it. With respect to Canton, though it was originally, as Mr. Crawford observed, a poor province, the foreign trade which had been carried on there for 200 years had really made it a very wealthy place. A mandarin was said to be "promoted" to Canton—the only place which was spoken of in that manner—but an appointment to Yunan was considered in a very different



ways by which this position may be reached, and by which communication may be maintained with more or less difficulty :—

- 1st. By the valley of Assam, in which we are most interested.
- 2nd. Through Burma and the valley of the Irawaddi.
- 3rd. If the maps are correct, by the valley of the Lantsang-kiang or Camboja River, of which the French are believed to be in possession.
- 4th. From China Proper by the Yang-tse-Kiang and its tributaries ; and
- 5th. From Tibet.

Leaving the French, the Russians, and the Chinese, when organised and accustomed to fight under French and Russian officers, as they soon may be, to consider the advantages of the other routes, and avoiding that through Burma, as likely to lead us into difficulties, and to the expenditure of English lives and English money in foreign states, which might be more profitably employed in consolidating our own, he trusts that the Royal Geographical Society may be induced to recommend to Government that an exploring party may be sent, from our advanced station of Sudiya in Assam, to follow up the investigations of the late Colonel Wilcox, to ascertain the various passes by which access may be had to China in that direction, and whether localities may not be found at which English soldiers, missionaries, merchants, and miners may be advantageously settled on that frontier.

In our preparations for the defence of India against invasion by a Russian army advancing over the steppes of Central Asia and through the defiles of Afghanistan, we have expended thousands of English lives and millions of English money ; let us take care that we may not be called upon to meet a much less chimerical and more formidable danger from another quarter, when, in the disruption of the Chinese empire, we may have to contend against Russian and French influences nearer at hand. The countries to which attention has been drawn are said to be rich in mineral wealth of every description. We have seen what that has done for *California*, *Australia*, and *Columbia* in attracting English enterprise ; and the same influences, under the guidance of Providence, may place us in a position to retain dominion over India, until we can safely make it over to the Christian rule of its native governments, and be united to it by firmer bonds than can in any other way exist.

The CHAIRMAN, in closing the meeting, congratulated the Society upon the discussion which had taken place. Whatever might be thought of the commercial advantages of the proposed routes, one thing was certain, namely, that geographical curiosity had been excited by the papers which had been read, and geographers would now be stimulated to go on with those inquiries which had been thought so important by former Governors-General of India.

The meeting was then adjourned till January, 1861.

Fourth Meeting, Monday, January 14th, 1861.

LORD ASHBURTON, PRESIDENT, in the Chair.

PRESENTATIONS.—Colonel W. K. Loyd, and Walter Spencer Stanhope, Esq., were presented upon their Election.

ELECTIONS.—The Right Hon. H. U. Addington ; Consul A. W. Hanson ; Sir R. Digby Neave, Bart. ; Colonel T. P. Shaffner, of the U. S. ; Captain A. Wilson ; and S. Orchart Beeton ; C. J. A. Rumbold ; T. H. Rumbold, and J. Ralph Shaw, Esqrs., were elected Fellows.

ACCESSIONS.—Among the accessions to the Library and Map-rooms since the former Meeting were the Radcliffe Catalogue of Stars; Bohn's Pictorial Geography; Bagster's Bible of Every Land; Stainton's Entomologist's Annual for 1861; Stanford's Australia; Commander Maury's Storm and Rain Chart; M'Donnell Stuart's Map of his discoveries in Australia; Schwenzen's Map of Sweden, Denmark, and Norway; Williams's Map of Pegu, and Hobday's Martaban; Du Chaillu's Western Equatorial Africa, &c.

EXHIBITIONS.—Certain specimens of Australian Ores, presented to him by Mr. A. C. Gregory, of the North Australian Expedition, were exhibited by Professor J. Tennant, F.R.G.S.

The Paper read was—

Journal of his Expedition across the Centre of Australia, from Spencer Gulf on the South to Latitude 18° 47' on the North. By J. McDONALL STUART.

Communicated by MESSRS. CHAMBERS and FINKE, through SIR R. I. MURCHISON,
VICE-PRES. R.G.S.

[The paper will be printed in the Journal.]

FROM the Journal of Mr. Stuart it appears that he left Chambers Creek, in South Australia, at the beginning of March last year, with Mr. Keckwick and one other man, and proceeded in a north-westerly direction, his object being to penetrate across the continent. As he proceeded, instead of meeting with an arid desert, as geologists had predicted, he found a well-watered country, with numerous creeks, several rivers, abundance of grass and scrub. The geological character of the country for the first 400 miles was tertiary and secondary, and occasionally he saw large masses of sandstone. He then crossed a high primary range, and for the remainder of his advance met with little else than the older rocks, or those of volcanic formation. He proceeded without meeting with any serious obstacle, and without encountering any of the natives, until he reached the centre of Australia. There he erected a pile of stones, planted the British flag, and enclosed within the pile a bottle containing a paper with a notice of the fact. This occurred on the 16th of June. On his progress north-west his difficulties commenced. The scrub was in places impenetrable, and he was obliged to make his route more easterly towards the Gulf of Carpentaria. Water became scarce, and the soil sandy. The vegetation hitherto met with had been principally scrub and gum-trees, but on approaching the central regions he saw palm-trees. Water was procured at a short distance under ground, but there was none on the surface.

The country Mr. Stuart had passed through, after the first or M'Donnell range, had been undulatory or flat; but on advancing north he came to ranges of mountainous hills, the principal of which he called the Murchison range; and from these hills the rivers that flow north-west and north-east take their rise. Looking from an eminence towards the west he saw a high mountain and elevated ground. The valleys between the ranges of hills were fertile; and one river, which was flowing towards the north by west, was about ten chains wide, and had the appearance of being a constant stream. This he conceived to be the character of many of the creeks and springs that he came to. On looking towards the east there were indications in the atmosphere of the presence of a large body of water behind the high land which bounded the horizon in that direction. Until he reached the range of hills he had not seen many natives, though numerous traces of them were frequently observed; but they then began to show themselves, and made hostile signs. Two of them were first seen near the scrub, but as soon as Mr. Stuart approached they ran away. A few days afterwards they appeared in greater numbers, and, with menaces, made signs to his party to go back. It was in vain that Mr. Stuart made friendly demonstrations; and at last the natives threw a shower of boomerangs at him. His men were ordered to load their guns, and as the savages approached nearer for the purpose of surrounding the little party, they were compelled to fire. The savages did not desist from their attacks, and a second volley was fired at them. Under these circumstances Mr. Stuart, with great reluctance, felt obliged to retrace his steps. He returned to the point he started from on the 9th of September, after having travelled upwards of 2300 miles in six months and two days, and having penetrated within 250 miles south-west of the Gulf of Carpentaria. The geological character of the mountainous ranges was igneous, the appearance of quartz and other granitic rocks giving evidence of the presence of metallic treasures. Only one portion of the route, for the distance of about 60 miles, was sterile and sandy.

The PRESIDENT said, of the various subjects that had been brought before the Society, he knew of none which exceeded in importance the one they were about to discuss. Explorations in Africa, or in any other part of the globe, were interesting to us as citizens of the world, but the present exploration was interesting to us, not only as citizens of the world, but more especially as citizens of this great country. We might take pride in the fact that a discovery had been made, not at the expense of the Government, but of two or three of our fellow-citizens; who, not daunted by a succession of disasters and failures, had not shrunk from supplying the necessary funds, and they further had the judgment to secure the proper man, to whose abilities, energy, and perseverance, was owing the success of the expedition. And so great was

Mr. Stuart's energy that he had gone forth again with a larger party, with strength sufficient to daunt the natives, and to overcome any of those impediments which had been the cause of his returning on the last occasion. There was one curious circumstance: it was that an old chief, accompanied by two sons, made a freemason's sign to Mr. Stuart; and on Mr. Stuart looking intently at him he repeated the sign, and showed great satisfaction when it was answered.

SIR RODERICK MURCHISON, F.R.G.S., said he had always taken a special interest in the exploration of Australia, and had lost no opportunity of stimulating those researches, which had terminated in this most glorious expedition of Mr. Stuart. The exploration, though carried out by private individuals, had been warmly encouraged by the Governor of the colony, Sir Richard M'Donnell. Gentlemen would recollect that a very expensive expedition had been sent out, with twenty camels, from Melbourne, to accomplish the same end from another point. In the mean time Mr. Stuart, with his two men and thirteen horses, had accomplished more than the efforts of all other explorers in that direction. Ever since he (Sir R.) had been connected with the Society he had had at heart the establishment of some colony in one of the great bays on the north of Australia, either in the Gulf of Carpentaria, or more particularly in Cambridge Gulf, or near the mouth of the Victoria River, where Gregory's expedition was so long encamped.

He was now about to make an apology for a theoretical opinion he had formed as to the difficulty of traversing this continent; and he might explain why he, in common with other eminent geographers, had entertained great doubts upon the feasibility of this enterprise. When Mr. Gregory arrived at the extreme point of his expedition from the north, he was stopped by a completely saline desert. Again, when Captain Sturt advanced into the centre from the south, he also was stopped by an impenetrable saline desert. With these facts before them, it was not unreasonable to arrive at the conclusion that the interior consisted of desert. Yet this Stuart, who was one of Sturt's men, devised for himself the route which he had taken, and which he had so successfully followed. The discovery might be of very great importance to this country, because, with the establishment of a port of refuge or a colony on the north coast, it would give us a ready access to the Eastern Archipelago, and also enable us to lay down a telegraph for communication right across the continent with all our great colonies in the south and west of Australia. Sir Richard M'Donnell proposed that the whole of the interior in question should form a part of the colony of South Australia. He could not sit down without acknowledging the high credit that was due to Colonel Gawler, formerly Governor of South Australia, who, in spite of the reasoning of others, and in spite of adverse appearances, had always maintained that a passage could be accomplished.

COLONEL GAWLER, F.R.G.S., complimented Sir Roderick Murchison upon his candour in acknowledging that he had altered, to a certain extent, his former opinion. It was like men of true science, who, when realities came before them, grasped them at once, notwithstanding their own anticipations. They had stood opposed, but it was an amicable suit, and at last Mr. Stuart had settled the question. He (Col. Gawler) rejoiced in the result, not because it proved that his anticipations were correct, but on account of two circumstances which had been often referred to. In the first place, it showed that Great Britain possessed in Australia not only capabilities for a fringe of colonies with some twenty or thirty millions of inhabitants along the shores of that continent, but capabilities for a great and compact empire, which might possibly contain a hundred millions of souls. A perusal of Mr. Stuart's narrative satisfied him that, from Chambers Creek to the end of the flat-topped hills near to the James and M'Donnell ranges, there was a very beautiful country for

Australia. In the Adelaide district, the proportion of good to inferior land was about one-third; and he thought the same proportion would be found to prevail in this newly-discovered territory. The M'Donnell range was manifestly the great dividing barrier between the waters of Northern and Southern Australia; and, as Mr. Stuart observed that the streams south of that range flowed in an easterly and southerly direction, it left the water system of Western Australia a greater mystery than ever. He quite expected that a large portion of the drainage of Western Australia went down into Lake Torrens, but it was now quite evident that it did not take that course. In the next place, he conceived there would be no difficulty in running a line of railway to the northern coast, except over the M'Donnell range; for on the other side of the range there were the immense plains where Mr. Stuart was turned back. These plains extended, apparently, up to the Red Sand, which stopped Mr. Gregory from the Sturt Creek. But on them there was a large number of gum-trees, and the gum-tree would never grow without moisture; and, though there might be no surface water, yet it was evident there must be a large amount of water below the surface. Therefore he saw no reason why a line of communication should not at once be carried across from the south-eastern coast to a north-western colony, and thus open an outlet for the produce of the continent, to be shipped to the rich neighbouring islands and the southern parts of Asia.

MR. C. BONNEY said he could bear testimony to the energy, courage, and endurance that must have been required to accomplish the journey undertaken by Mr. Stuart. He had recently returned from Australia, and five months ago was within a few hundred miles of the centre of that continent. It was then the cool season, but even at that time travelling was a work of great difficulty from the almost entire absence of water and grass for horses. He could, therefore, well appreciate the merit due to Mr. Stuart and to Messrs. Chambers and Finke, who had fitted out the expedition. But with regard to the result of the journey, it must not be too hastily concluded, that because Mr. Stuart had been able to cross from south to north, therefore the whole interior of Australia was a good and habitable country. His own impression still remained the same, that the great bulk of Australia was uninhabitable. There was no country more likely to deceive the traveller from the different aspect which it bore under different circumstances. A traveller going through the country after rain would be led to the conclusion that he saw before him a fertile country; but if he went a few months afterwards, he would find nothing but a sterile desert, altogether unfit for the habitation of man.

He had that day received a letter from Captain Sturt, the well-known Australian explorer, from which, with the permission of the President, he would read an extract.

He rejoiced, however, to think that at last a practicable route had been discovered from south to north, which might be made available for the electric telegraph and railway communication.

"I am not at all surprised at Stuart's success, for I know him to be a plucky little fellow—cool, persevering, and intelligent, as well as an excellent bushman; so that when I heard that he had gained such a footing in the interior on his first excursion, I felt sure he would succeed in crossing the continent sooner or later. He is entitled to all praise for his exertions; and it is really a matter of pride to me that it has fallen on one of my oldest and best followers to have achieved so very creditable an enterprise, and to have shown so much energy and zeal. He has fairly passed, or I should say surpassed, me, and may justly claim the laurels.

"Now with regard to his journey, and the character of the country he traversed, as far as I can judge from his letter to Chambers, I am really surprised that he did not cross any desert such as he and I traversed together.

He states that he crossed a plain of red sand with spinifex of about 60 miles in breadth, on which, I presume, there was no water; and this tract I should be disposed to call desert, though of limited extent; but I took it for granted that as Gregory, in lat. 20° and in long. 127° , found precisely the same kind of country as that from which I was forced to retreat in lat. 24° and in long. 138° , so the intervening country would be the same.

"Gregory found the creeks by which he descended from the hills to the south underwent exactly the same changes as those by which I had advanced towards the north—that is to say, that they gradually lost their current, assumed the character of a chain of ponds, and were ultimately lost amidst sandy ridges. Having myself penetrated at least 400 miles into the desert, I could not have imagined that it would so soon change its features to take them up again at a distance of 700 miles, that being about the distance between Gregory's position and my own.

"I believe Stuart started with the intention of making Cambridge Gulf on the west coast, but that, not being able to push to the westward, he ran up north, and passed about midway between Gregory and myself, and as near as could be the centre of the continent, and, being forced to the eastward of north, at last succeeded in gaining the southern fall of water, in lat. $19^{\circ} 47'$ and in long. 134° , which would be a point about 280 or 300 miles from the Gulf of Carpentaria in a N.E. direction, about 380 miles from me in a S.S.E. direction, and about the same distance from Gregory in a direction of W. $\frac{1}{2}$ S. Stuart's course must therefore have been to the eastward of the point from which he started, the nature of the country being such as to prevent his going to the west of it. Now if you refer to the Introduction to my Central Expeditions you will find that one reason I gave for taking the line I did was, that from observations I had made of the migration of birds on the banks of the Darling and in South Australia, I had been led to hope that about lat. 20° and long. 134° a better country would be found, because I calculated that the two lines of migration would meet, the one N.W. from the Darling, the other due S. from the shores of St. Vincent's Gulf, about where I have pointed out; and there, it would now appear, Stuart has discovered a better country, and added another proof to the many that have been recorded of the truth of these natural indications.

"Had Gregory found it practicable to keep more to the south, when crossing from the Victoria to the Gulf of Carpentaria, he would probably have struck the heads of the creek from which Stuart retreated; but he was forced to the north by the sandy and sterile nature of the table-land on which he travelled, and could never get a glimpse of the depressed southern interior. I take it that the country Stuart has discovered is far to the south and west of Gregory's track. Van Diemen and Arnheim Lands must at one time have been an island, as the whole continent was once an archipelago; and it was the conviction on my mind as to this fact that led me to hope Gregory would be able to descend at different points of his passage across the northern portion of the continent by streams, the *opposites* to those debouching on the coast, of which there are so many; but from the account he gave of the appearance of the country to the south of him, I was led to apprehend that the desert came right up to where he was, and that vast masses of sand having been deposited on the southern slopes of the hills imbibed all the water, and thus rendered a descent to the south impossible.

"It is worthy of observation, that whereas I found the sand-hills running N. and S. nearly, Gregory, at a distance of 700 miles to the W.N.W., found them running E. and W. nearly, and that too at a difference of elevation of between six and seven hundred feet."

COL. SYKES, F.R.G.S., said he should not have risen but for what had fallen from the last speaker, whose observations would seem to modify the expecta-

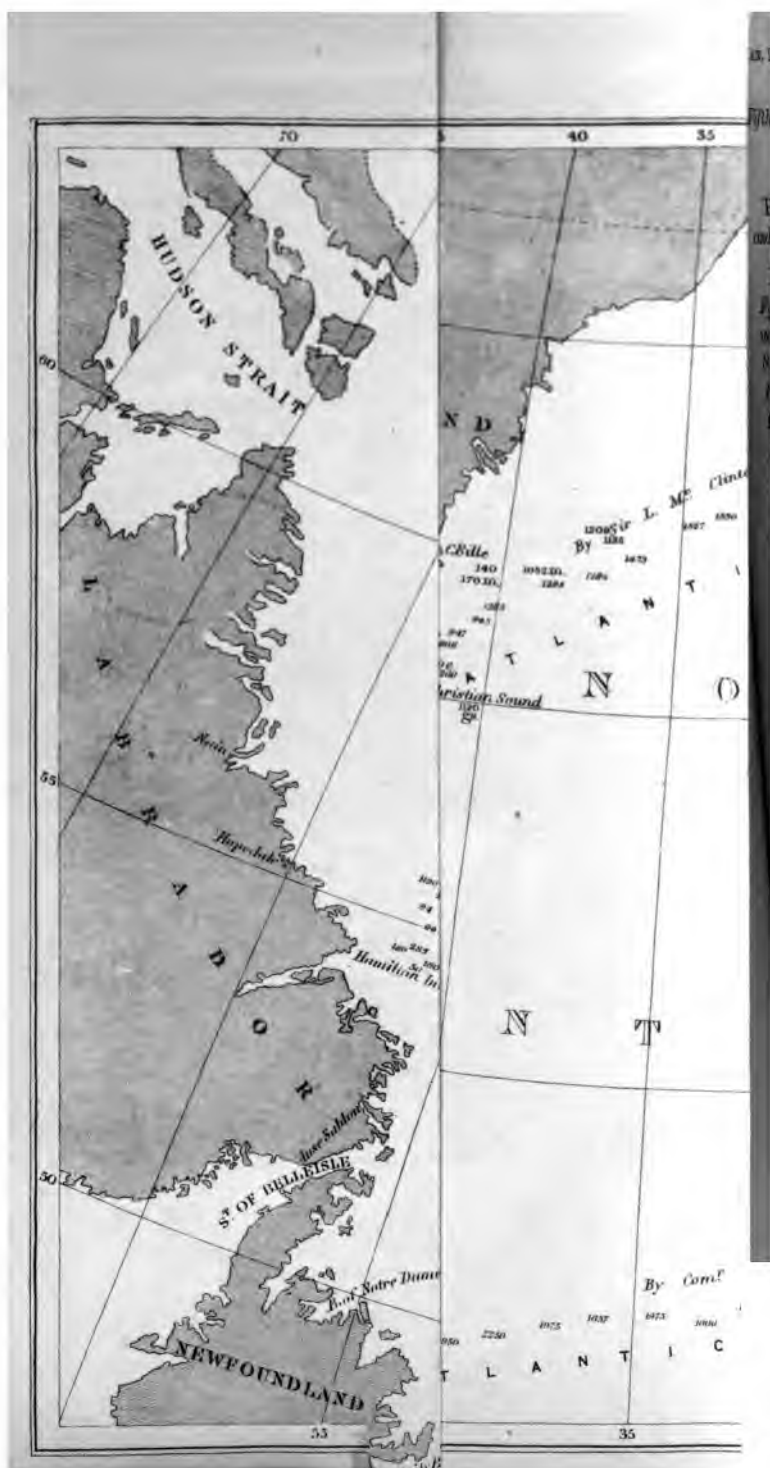
tions held out by Mr. Stuart, of the country being habitable and suitable for colonization. An extensive and impenetrable scrub was found flourishing in the tract, therefore there must necessarily be a supply of moisture to enable the scrub to grow. Whether the water was under or over the surface was another question, but there must be moisture to a great extent. Again, physical geographers were aware that the world was surrounded by a belt $22\frac{1}{2}^{\circ}$ to the north and to the south of the equator which was subject to annual supplies of water both during the south-west and the north-east monsoons. The greater portion of Australia traversed by Mr. Stuart lay within that parallel, and it was therefore natural to assume that it came under the same physical conditions as other parts of the earth as to supply of moisture. This probable fact would remove the impression that might have been produced upon the minds of the audience by what had just been said.

LORD ALFRED CHURCHILL, F.R.G.S., stated that he had received a letter by the last mail from Sir Charles Nicholson, which bore out the observations of Sir Roderick Murchison relative to the capabilities for the formation of a colony in the northern part of Australia. The discovery of Mr. Stuart was likely to effect very great consequences to the future of Australia, because according to the present means of connecting Sydney and Melbourne with India, a very long and dangerous voyage was necessary. Now, if it was possible to form a new colony at the north of the continent, the establishment of telegraphs and railroads, to which he saw no physical objection, would be of very great value to the south by opening up a direct communication with it. With regard to hot winds, at Melbourne they came from the north, and at Sydney from the north-west; and the theory had been formed that those hot winds were caused by passing over a desert tract in the centre of Australia. That had been proved by Mr. Stuart not to be correct as regarded the whole of the interior. Possibly there might be desert on both sides of the region he traversed. However, so far as he had gone he had discovered a fine country, which, from its peculiar formation and peculiar vegetation, might afford or would afford facilities for intercourse between the northern and southern parts of the continent.

COUNT STRZELECKI, F.R.G.S., reminded the meeting that in 1858 he was selected by Sir Roderick Murchison to transmit to Mr. Stuart the first token of the Society's approval of his exertions in exploring the north at his own expense; and having on that occasion expressed his belief that this acknowledgment would stimulate Mr. Stuart to further exertion, he was extremely happy now to find that his expectations had been more than realised. Mr. Stuart had cleared up the mystery which for so long a time had hung over the centre of Australia. After reviewing the various theories which had been propounded based upon the observations of previous travellers, Count Strzelecki said that he was at one time himself of opinion that the interior was a vast desert. He was ready now to recant that view, to acknowledge the value of the discovery which Mr. Stuart had made, and to render full justice to those, less successful, who preceded Mr. Stuart in his enterprise.

The Noble PRESIDENT, in closing the discussion, said, this no doubt was a most important point in the history of Australia; and both that country as well as our own must feel deeply indebted to the individuals who had either contributed the means, or through whose gallantry and energy the exploration had been so successfully carried out.





, January 28th, 1861.

IBURTON, PRESIDENT, in the Chair.

he Rev. G. Richards, D.D. ; Consul A. W. Hanson ;
t., were presented upon their Election.

arles T. Bright ; General Eber ; the Rev. C. J.
C. Pemberton Hodgson ; the Rev. E. H. Main-
quis of Sligo ; the Rev. C. Hill Wallace ; the Rev.
. A. T. Windus, I.N. ; and James Aikin ; Walter
ll ; John E. Davis, Master R.N. ; N. Vaughan
. Wilson Holmes ; John Learmonth ; Alexander
oman ; G. H. Oliphant Ferguson ; Julius Reuter ;
mald Thomson (Attaché Persian Mission) ; John
ler, Esqrs., were elected Fellows.

g the Accessions to the Library and Map Rooms
ting were Dunlop's Hunting in the Himalaya ;
Manual ; Jinman's Winds and their Courses ;
Institute of Civil Engineers, of the Society of
neva, Royal Society of Edinburgh, &c. ; Storm
Islands by the Board of Trade ; Admiralty
Atlantic Ocean, &c.

subjects for our consideration to-day are of so in-
at I should be doing unwisely if I were to occupy
moments, in making such preliminary observations
r President. The papers which are about to be read
physical and geographical facts upon which the pro-
or the extension of the Electric Telegraph line between
a, by the route of the Færøe Islands, Iceland, Green-
comes especially within the province of the Royal
receive and to record those facts as purely belonging
l Geography. We are so fortunate as to have a great
; for us in the field of geography ; some who have
iety, like Speke and Livingstone, are doing our work,
ing work for many other societies. We have labourers
l not less useful to us as well as to the world : they
ied in other pursuits, but who come to us to record
rved, and to enable us to treasure them up as the
rch. Among the labours of this class, not the least
ies which we are met to record to-day. They were
urpose of acquiring geographical knowledge simply,
ut the great and beneficent scheme of connecting the
and America by means of telegraphic communication.
hat we receive these facts, we must take care not to
d away into that which is altogether out of our pro-
nounce any judgment upon the value of that scheme.
hers to decide, not for us. Therefore, whilst we our-
e facts that may be presented to us with philosophic

calmness, there may, on the other hand, be those who are so deeply interested in the material success of electric telegraph connection with America, as to be drawn into an eager contest to set up the merits of one scheme in preference to those of another. Should there be any gentlemen present prepared to carry these feelings into the discussion, I feel assured they will remember this, that it is those who are beaten that generally complain, and that the man who is the winner at chess is not the man to throw the pieces at his adversary's head. I believe we shall have no symptoms of distress exhibited; that we shall not have anybody manifesting the conviction passing in his mind that he is worsted in the argument. I will now call upon Sir Leopold McClintock to read the first paper that is set down on the list.

The Papers read were—

1. *Surveys of H. M. S. Bulldog.* By Capt. SIR F. LEOPOLD MCCLINTOCK, R.N., F.R.G.S.

IN compliance with a request from the promoters of the North Atlantic Telegraph Route, Her Majesty's Government despatched the *Bulldog* under my command, on the 1st of July last, with orders to ascertain the depth of the ocean, and as far as possible the nature of the bottom, between the Færøe Islands and Iceland, Iceland and Greenland, and between Greenland and Hamilton Inlet on the Labrador coast. I was also directed, should my time permit, to make a slight examination of that inlet—being British territory; but in no other instance did my duty extend to the examination of any of the coasts I was required to approach. With the exception of Hamilton Inlet, none of the positions for the shore-ends of the proposed lengths of cable were suggested when I sailed from England. The duty of selecting them was subsequently entrusted, by the promoters of this Telegraph Route, to Captain Allen Young in the *Fox*; consequently, my lines of soundings have not in every instance been carried in from the deep sea, so as to unite exactly with the coast explorations of Captain Young.

Although my visit to the Færøe Islands was not for the purpose of making any examination of their shores, yet I could not fail to observe that a submarine cable, in connection with the main island, and a land-wire across it, could be maintained with perfect ease. In my official report to the Secretary of the Admiralty, written previously to my return to England, and which I shall have frequent occasion to quote, I have remarked that on landing at Thorshaven, the chief town of the islands, I observed that the little bays near it afforded ample shelter and security for any cable landed within them. The best harbour in the group is Westmanshaven, but it is situated in a channel through which the tide runs fully six miles an hour, and for this reason it would not be advisable to bring the cable there.

I was informed that the channel between the islands of Strömöe and Osteröe is almost obstructed in the middle, being contracted to fifty or eighty yards; hence there can be but a very slight flow of tide through it, and upon this account I would seek a landing-place for the Iceland cable near to the north-west outlet of this channel, at Haldervig or Eide.

Leaving the Færöe Isles on the 6th of July, we sounded across towards Ingolfsholde upon the south-east shore of Iceland, a distance of 280 miles, and found the depth to be generally less than 300 fathoms, the greatest depth being 680 fathoms. The specimens of the bottom consisted chiefly of fine sand, or mud and broken shells, and, in two instances, of minute volcanic débris; the temperature of the sea at 100 fathoms below the surface scarcely varied from 46°. The depth of water upon this section of the telegraph route is so moderate that it would be an easy matter to lay down a cable between Færöe and Iceland. Since my return I find that Beru Fiord, upon the east coast of Iceland, has been examined with a view to its selection as the landing-place for a cable; it is about 80 miles to the north-east of Ingolfsholde, and has the advantage of being somewhat nearer to Færöe.

On the 11th of July I arrived at Reikiavik, the chief town of Iceland; an expected supply of coals had not arrived, therefore I remained only three days, but returned again in October, when my stay extended from the 19th to the 28th. During these visits I obtained some interesting information about its physical aspect, its climatic condition, and the movements of the ice in the adjacent seas. I was informed that a telegraphic wire could not be carried along the south shore eastward of Portland, on account of the many wide rivers which have their sources amidst the mountains and glaciers of the interior. These rivers are much swollen in spring, when they carry down vast quantities of ice, and sometimes change their beds; but to the north of the central mountains no such difficulty would be experienced.

- The east and west coasts are very seldom visited by drift-ice, not oftener than seven or eight times in each century, whilst it is only upon two or three of these occasions that the drift of Arctic ice is sufficiently extensive to reach the south coast. True icebergs are *never* seen; the masses sometimes mistaken for them are small enough to float in comparatively shallow water, so that a cable would remain undisturbed at the bottom, its shore-end being carried into a fiord. Faxø Bay, on the south-west coast, enjoys a remarkable exemption from drift-ice; the last mention of its appearance within it is as long ago as 1683: neither does it freeze over—mer-

chant vessels trade there throughout the winter. A cable could therefore be landed in this bay with perfect ease and security, and probably to the westward of Reikiavik.

The entire population of Iceland scarcely exceeds 60,000 souls.

Education is perhaps more generally diffused than in any other country, and the topographical maps recently published by the Danish Government delineate its features most fully, and with the greatest possible accuracy, and would greatly facilitate the survey of a land-line.

Although Iceland is considerably larger than Ireland, and is of volcanic origin throughout, yet for long ages the disturbance occasioned by its subterranean fires has been limited almost exclusively to its south-western quarter, where Hecla is occasionally, and Katla has been very recently, in an active state, and where Geysers and boiling springs are numerous; nor is the adjacent sea free from like convulsions. In 1783 a submarine volcano burst forth in a probable depth of 200 fathoms, about 30 miles off the south-west extreme of the island; by it a new islet was formed; it soon after subsided, but still exists under water as a dangerous sunken rock. This volcano was again active in 1830;* its action appears to have been very limited, and within 4 leagues of it stands the time-honoured "Grenadier's Cap," a basaltic column, 80 feet above the sea; within 500 or 600 yards of this most remarkable rock the *Bulldog* sounded in 70 fathoms. Fortunately the telegraph route is not required to pass, by sea or land, through any part of this disturbed or suspected area. Five days of very calm weather enabled us to complete the line of soundings between Faxe Bay and the south-east coast of Greenland. The depths generally were very regular, the greatest being 1572 fathoms, and situated in mid-channel; but when within 40 miles of Greenland the depth decreased from 806 fathoms to 228 fathoms, in the short distance of $3\frac{1}{2}$ geographical miles.

The nature of the bottom was chiefly oaze, that is, fine mud partly consisting of minute organic remains; but near to Iceland volcanic mud and sand were more frequently brought up. The temperature of the sea at 100 fathoms below the surface gradually diminished from 46° near Iceland, to 39° off the Greenland coast. Circumstances which it is unnecessary to allude to here prevented me from commencing before 18th August the line of soundings between the south-west coast of Greenland and Hamilton Inlet on the Labrador coast, a distance of 550 miles.

* Some interesting notices of this and other submarine volcanoes are published in the 'Nautical Magazine' for July, 1860.

The Greenland shore was still blockaded by such a vast accumulation of drift-ice that we could not approach within 45 miles of it, at which distance the depth was ascertained to be 1175 fathoms. This line of soundings to Hamilton Inlet shows that the greatest depth—which is in mid-channel—is 2032 fathoms; and that the decrease is very gradual until within about 80 miles of Labrador, where there is a change from about 900 fathoms to 150 fathoms in 7 or 8 miles.

The ocean-bed consisted of ooze, but with fewer microscopic organisms than previously met with, whilst the average temperature of the sea at 100 fathoms below the surface was 40°.

Seven days were all I could devote to the examination of Hamilton Inlet. Its length was found to be 120 miles, whilst its width varies from about 15 miles at its mouth to scarcely half a mile at "the Narrows," which are about half-way up to its head, and above which it expands into an inland sea of about 20 miles in width. All this great inlet was rapidly explored, its main channel from "the Narrows" to seaward was sounded, and the whole laid down by Mr. Reed, master and assistant-surveyor, with sufficient accuracy for ordinary purposes; but these soundings are not nearly sufficient to meet the requirements of a cable-route, nor even to decide whether a cable should be landed there.

We found the depths to be very irregular, and seldom sufficient to secure a submerged cable from disturbance by icebergs. A perfect survey is absolutely necessary, and may show that the shallow water and reefs of rocks, which to our imperfect knowledge appeared intricate and unfavourable, may not only be avoided, but may afford a sure protection against the intrusion of icebergs within the mouth of the inlet. There are some small rocky islets off the mouth of this inlet, and of these the Hern Islets lie nearly in the middle and contract the widest channel of entrance to about 5 miles; the greatest depth obtained in this channel was 49 fathoms. Had the depth of water amounted to 70 fathoms in as far as this position, I would not hesitate in pronouncing favourably of Hamilton Inlet as a terminus to the cable from Greenland.

The greater part of the local information which I obtained here was kindly furnished by Captain Norman, a Newfoundland merchant, who has traded here each successive summer for twenty-four years; during the summer he resides at Indian Harbour, at the north entrance of the inlet, where there is a secure anchorage for vessels of moderate size. Captain Norman states that icebergs very rarely enter the mouth of Hamilton Inlet, and never pass within the Hern Islets; and for these reasons: 1st, that the current

which has borne them from the north is here deflected off-shore by the Esquimaux Islands, and carries them past the mouth of the inlet; and 2ndly, that the flow of water caused by the discharge of several large rivers into the inlet still further aids in carrying the drift-ice and icebergs out to seaward. During winter and spring this drifting ice prevents all access to Labrador; but by June Hamilton Inlet is usually quite free from it.

From Captain Norman I also learned that the deepest water along the coast is off Cape Harrison, and that a large river runs into Byron Bay adjoining it; moreover, Sloop Harbour (which is close to the river) is said to be an excellent one. Unfortunately my time was too limited to admit of any examination of this promising locality. It is very desirable to obtain more information respecting the ice and icebergs upon this coast. It could be furnished by the Newfoundland traders and seal-fishers, and perhaps by persons in the employ of Messrs. Hunt, Henley, and Co., of 8, Broad-street Buildings, E. C., a firm which has maintained an extensive establishment near to Hamilton Inlet for a very long period, fifty or sixty years, I believe. In addition to these sources of information, there are intelligent Moravian missionaries, whose settlements on the Labrador coast have existed for more than one hundred years.

The shores of Hamilton Inlet appear bold, rocky, and almost devoid of vegetation when viewed from the sea; as we advance up it, the land becomes lower, the undulations more gentle, verdure and trees appear, and at its head the whole country is densely covered with spruce, white pine, and white birch, but the tallest trees do not exceed 40 feet. I was informed that the interior is similarly wooded, and has an exceedingly scanty population of Indians, allied to the Cree nation; they all profess Christianity, and are a strictly honest, quiet race. The residents along the shores of this great inlet are of European or mixed blood, and do not amount to 200 souls. During summer they catch cod-fish, herrings, and salmon, and in winter they are occupied in trapping fur-bearing animals.

At the Hudson Bay trading-post upon North-West River, at the head of the inlet, I met Mr. Smith, the gentleman in charge, who kindly supplied me with the only information respecting the interior that I was able to obtain. He seemed to think there would be no difficulty in carrying a wire from here overland to Mingan, on the Gulf of St. Lawrence. The Indians frequently travel from one place to the other, the distance not exceeding 250 miles. Should the cable be taken to this inlet, I would suggest that it be landed upon the south shore, to seaward of "the Narrows," as the tides

run through them with very great velocity. All other parts of the inlet freeze over to a depth of 3 feet, for the winters are very severe. The summers, though short, are no less remarkable for their warmth. At North-West River barley and oats ripen, and potatoes and other vegetables grow tolerably well. Mosquitoes are such an intolerable plague, especially to new comers, that unless their faces are carefully veiled or smeared with camphorated oil, brimstone ointment, or dilute creosote, they cannot either repel or endure their bloodthirsty attacks.

Leaving Labrador on the 17th September, I returned to Greenland for the purpose of completing such soundings as the drift-ice had previously compelled me to leave undone. Being, moreover, very desirous of meeting the *Fox*, and of ascertaining from Captain Young where the cables were to be landed, so that I might continue the deep-sea soundings in to those positions, I visited the settlement of Julianshaab on the 29th September, but no information could there be obtained of the *Fox*. The season was very remarkable for the great quantity of drift-ice which encumbered the shore, and had hitherto prevented vessels from approaching Julianshaab; in fact, so much ice had not been known for nearly thirty years. This coast, I may remark, is usually quite free from ice by September. Following up my inquiries, I learned that the climate is not nearly so severe as is generally supposed, the fiords are only partially frozen over in winter; a few cows, goats, and poultry are reared; and although the summers are cold, turnips, spinach, lettuce, and radishes grow in the open air.

I was informed that the large fiord of Tessermiut, which lies midway between Julianshaab and Cape Farewell, was the most likely place to afford security for a cable: that icebergs never came into it, and that there would be found ample depth of water from it out to sea; also that there is safe anchorage in a spacious bay near its mouth as well as high up in the fiord. On 3rd October I put to sea, intending to sound into Tessermiut Fiord, should the ice permit; but it was with difficulty we got out, for a south-east wind had brought up much more ice from Cape Farewell, and prevented our approaching within 40 miles of Tessermiut or the adjoining coast; and the ship sustained considerable damage from unavoidable collisions with the ice before she got clear out to sea. It is well known that a current from the North Atlantic Ocean bears along with it all this ice round Cape Farewell, and up the west coast of Greenland for several hundred miles. It carries the drift-ice for the most part along the outer islands, and it is only when there is a strong wind blowing in from the sea that the ice

comes in between the islands and enters the fiords; it is almost exclusively low or flat ice which thus drifts in, the larger masses and icebergs, which draw more water, nearly always keep in the main stream along the outer islands.

It is evident that were a cable brought in from the deep water existing outside and between these islands, and carried sufficiently far up a deep fiord, its security from icebergs would be insured; and that to protect the mere shore-end from the ordinary flat-ice would be a matter of no great difficulty.

Since my return to England I have received a letter from the Resident Inspector of South Greenland, the well-known Dr. Rink, whose writings on Greenland have added so largely to our knowledge of the physical condition of that great Arctic continent. The opinion of such a man deserves serious attention, since it is scarcely possible to quote a higher authority upon the point in question. I therefore do so almost in his own words.

"I have thought much," he writes, "over the proposed route for the North Atlantic Telegraph; at first I doubted the possibility of accomplishing it, but now I am of a contrary opinion. You can lay down the cable from Iceland round Cape Farewell into some fiord upon the south-west coast, where ice cannot ground upon it, or touch it except for a few fathoms out from the shore, and this last part may be easily protected. But to carry the wire across the interior of Greenland, as I have heard of, would be impracticable." This letter was written in Greenland, before either the *Bulldog* or *Fox* had arrived there, and experience has since shown the necessity for acting in accordance with the suggestion of Dr. Rink. The length of cable required to unite Iceland with West Greenland will be about 800 miles.

Finding that nothing more could be done upon the Greenland coast, I commenced a line of soundings towards Rockall, but a succession of tremendous storms and want of fuel prevented the completion of this service. One of the few casts obtained deserves particular mention; the depth was first ascertained to be 1260 fathoms: then a sounding-machine was lowered to obtain a specimen of the bottom, and about 50 fathoms of line more than the depth required was payed overboard to ensure its being down. On hauling it in, several small star-fishes were found adhering to that part of the line which had lain upon the bottom! The nearest land at the time was Iceland, and it was 250 miles distant. I simply mention this interesting fact, which I witnessed, leaving it to be enlarged upon by Dr. Wallich, the able naturalist of the Expedition, who is still employed by the Admiralty in the micro-

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scopic examination of our specimens of the sea-bottom. The result of his investigations (which will be published hereafter) may be of great importance to Marine Telegraphy, proving, as it will do, the existence of animal life at very great depths.

We are aware that the coating of a Mediterranean cable was attacked by minute creatures allied to the ordinary *Teredo*,* at the depth of 60 or 70 fathoms, and should it be found that similar boring animals exist in great depths, it will become imperative to protect the insulation of the wire against their ravages; but time does not admit of a digression from the object of this paper, which is simply to lay before you my experience and opinion with regard to the physical aspect of the proposed route; it may not, however, be out of place to mention that the great pressure exerted at depths approaching to 2000 fathoms is sufficient to squeeze the tar freely out of rope: could we recover a cable from these depths, we should find the tar similarly expressed from its canvas wrappings. If the tar used were of a sufficiently viscid description to harden and remain coated upon the wrappings, it would probably afford quite a sufficient protection against these destructive creatures.

Once laid in deep water, the North Atlantic Cable will probably be more secure and more durable than any other; as it will lie at the bottom of a sea where the temperature is unusually low, and where animal life is proportionately rare.

If, during the coming summer, a final selection and survey of a landing-place in Greenland be made, all that will remain to complete the entire route will be a landing position in Labrador; and that a cable can be safely landed upon some part of this coast, if not in Hamilton Inlet, it is hardly possible to doubt.

Judging then from my own experience, and from the facts which the voyage of the *Bulldog* has brought to light—many of which are supported by the most reliable local authorities—I am of opinion that with regard to the practicability of laying a North Atlantic cable there are no grounds for serious misgivings; on the contrary, nearly all the information which has so far been ascertained is of a kind favourable to the accomplishment of the undertaking.

That there is usually impenetrable ice upon the south-west coast of Greenland for eight months out of the twelve—(i.e. from January until September)—we are well aware; and hence originates the chief difficulty of the route. It is obvious that the Greenland cables cannot possibly be laid down whilst this ice remains upon the coast; but in ordinary seasons it does not clear away until

* See a Paper by J. Gwyn Jefferys, F.R.S., on 'The British Species of *Teredo*,' published in 'The Annals and Magazine of Natural History' for August, 1860.

autumn is far advanced, and stormy weather becomes frequent. This difficulty, I apprehend, however, is not an insuperable or extraordinary one, since it is common to all similar operations at sea requiring for their accomplishment a like period of four or five consecutive days.

I have assumed that the ice ceases to obstruct the south-west shore of Greenland about the middle of September; but we can no more predict its movements than we can foretell the temperatures of the seasons, and the winds by which those movements are governed.

Exceptional seasons occur when it would be imprudent to attempt laying a Greenland cable: also rare seasons when it could be laid as early as July: again, there are seasons when the ice-drifts are detached from each other, so that vessels watching their opportunity may freely pass into harbour or out to sea during the summer months.

In order to meet these ever-varying circumstances, it is the more necessary that the utmost caution be observed in all matters connected with the laying down of the Greenland lengths of the great cable; that the most suitable steamers be selected, and the highest engineering and nautical skill be employed.

And that this country possesses all the needful appliances and the amount of professional talent requisite for the accomplishment of this great undertaking, is no more to be doubted than that she possesses men of sagacity to appreciate its vast utility, and of commercial enterprise to bring about so desirable an issue within the next two or three years.

The second Paper read was—

2. *Synopsis of the Surveys of the Fox, under the Command of Capt. ALLEN YOUNG, F.R.G.S.* By Sir CHARLES T. BRIGHT, F.R.G.S.

I HAVE been requested by the promoters of the North Atlantic Telegraph to present to the Royal Geographical Society a synopsis of the report which has been handed to me by Captain Allen Young, upon his recent voyage in the steam yacht *Fox*, and his careful and elaborate survey of the proposed telegraphic route between Europe and America, by way of the Færöes, Iceland, and Greenland.

FÆRÖE ISLANDS.

This most interesting group of isles, the capital of which is Thorshaven, lies some 200 miles north of Scotland, and is under the authority of the Danish Crown. I will not occupy the time of the

Society in discussing the political, physical, or other characteristics of these islands, but proceed at once to quote some interesting extracts from Captain Young's report. He says:—"We were naturally anxious to reach the spot at which our work was to commence, and to ascertain the first foreign station at which the telegraph cable was to be landed. We were glad to make the Færøe Islands, distant 50 miles, on the evening of the 2nd August, the remarkable clearness of the atmosphere and the height of the land making our distance from it apparently far less than we were by our observations. When 46 miles E.S.E. from Naalsøe we obtained soundings in 102 fathoms, sand and shells. We here passed through many patches of discoloured water of a reddish hue, caused probably by minute animalcules on the surface, specimens of which, brought up by the towing-net, were preserved. Specimens of water, both on the surface and at various depths, were frequently obtained during our voyage and preserved, the temperature and specific gravity being registered in the meteorological journal.

"On the morning of the 3rd the land was obscured by clouds and mist, which, as the sun rose, gradually dispersed, and enabled us to obtain views of the land, and also to fix our positions by Born's chart to commence a line of soundings into the north point of Naalsøe; the depths were 36 to 26 fathoms, with a bottom of sand and shell."

Thorshaven.—"On rounding the north part of Naalsøe we took a fisherman on board as pilot, and at 10.50 anchored in Thorshaven, and immediately commenced an inquiry and examination of the locality, and testing the accuracy of all the charts and maps in our possession. The results were as follow:—Thorshaven and bay is protected by Naalsøe, and is land-locked, excepting on two points to the south-east, and on one point to the north-east. A swell sets in to the inner harbour with south-east gales; but this cannot be to any very great extent, from the fact that vessels lie at their moorings throughout the winter. The bay has good anchorage, varying in depth from 25 to 8 fathoms, bottom of sand, gravel, and shells, with a few patches of hard ground. Vessels usually moor in the two inner harbours or creeks, the northern being most frequented for the facility it offers for loading and discharging cargoes. Either of the inner harbours would do very well to land the telegraph-wires; but from the many vessels frequenting the port it appeared desirable to select another place; for, even were the cable to be buoyed, the risk from the ships' anchors would be considerable, on account of the want of space; but half a mile southward of Thorshaven is a small cove called Sandygerde, where the cable could be

landed in safety and clear of ships' anchors. This cove is $1\frac{1}{2}$ cable's length across and about the same depth, and shoals gradually to a sandy beach; it is intersected at the head by a watercourse and mill, the land sloping gradually up an extensive valley to the interior. As many additional soundings were obtained across the fiord as our time would admit, proving that although the channel is uneven, there is nothing to prevent bringing a cable in from sea. From the most reliable information from pilots and our own observations, the stream on the flood never exceeds 4 knots on the strongest spring tides, whilst on the ebb it is much weaker, and at times scarcely perceptible. It is high water at full and change at 4 o'clock: the flood runs to the southward. The Gulf Stream appears to sweep round these islands from left to right, or direct as the hands of a watch; and therefore in sailing from Thorshaven for the northward, by starting with the first of the flood and passing to the southward of Stromøe, and through Hestøe and Westmanshaven Fiords, you can carry a 9 hours' favourable tide. The rise of tide at Thorshaven does not exceed 6 feet."

Westmanshaven.—"We left Thorshaven at 1 P.M., passing through Hestøe and Westmanshaven Fiords, and anchored in Westmanshaven in the evening. The scenery in these fiords is very magnificent, and as we steamed through with a strong head-wind and weather tide, the surface of the water covered with sea-birds, the lofty hills on either hand rising to the height of 1500 to 2000 feet, with vast basaltic caverns and columns in the cliffs, formed a picture not easily forgotten. As I had heard that Sir Leopold M'Clintock had already examined this port, I did not deem it necessary to delay the ship for that purpose. The fiord appears clean and clear, with deep water close into either shore. I was informed that there is 70 fathoms water in the middle, a little north of Welbestad, and the stream in strongest spring tides runs 6 knots through the fiord. The rise of water is much influenced by the winds outside; it has reached 10 feet at spring tides, and has been known as low as 4, but the mean rise appears to be from 6 to 8 feet. Westmanshaven is said to be the best harbour in the islands; it is completely landlocked, with a bar, probably formed of the débris washed down from the surrounding hills, and accumulated by the action of the streams and eddies in the fiord. I fear the current in this fiord would be disadvantageous."

Haldervig.—"We left Westmanshaven on the evening of August 5th, and, after weathering the northern extremity of Stromøe, entered the sound between Stromøe and Osterøe, and anchored at Haldervig at 11.30 P.M. on the same night. An examination of the

port and estuary of the sound was commenced. The results of these observations, which occupied two days, were, that little or no stream is found in the sound; that Haldervig has good anchorage, and is perfectly landlocked; the deepest water is 34 fathoms, bottom black mud and sand, but that a sand-bar exists between Eide Point and Stromøe, over which there are $8\frac{1}{2}$ fathoms in the deepest part; and as in northerly gales the sea is said to break upon it, I consider that the cable would require a strong shore-end, to ensure its safety in crossing this place. This bar lies rather within the entrance and narrowest neck of the sound." In the summary Captain Young states:—"At Haldervig we surveyed harbour and fiord, and found all satisfactory, and I think that place to be well adapted for the reception of the cable. We found but little current, and the cable can be taken in, in a tolerable depth of water, into a perfectly land-locked position."

ICELAND.

"On approaching the coast of Iceland we got occasional soundings towards Ostré Horn, under which we were obliged to anchor in a dense fog, after getting inside an extensive and dangerous reef of rocks, called by the Icelanders the Hartinger and Bortinger. These reefs lie two miles east (true) off this cape. They do not appear on the Danish surveys, but I afterwards found them as a single rock upon a French chart."

Beru Fiord.—"On the morning of August 12th, the fog having lifted, we weighed under steam, and got into a position to carry a line of soundings into Beru Fiord, between the islands of Papey and Kogar Point: these soundings average about 30 fathoms, principally sand and shells. We anchored off Djupivogr factory the same day, and it being Sunday we ceased operations during the afternoon. The weather that day was the finest we had had since we left England, and the evening was truly summer-like. During the following five days, and when not prevented by the prevalent rain and fogs, we proceeded with the examination of the fiord, and finding it would not be advisable to carry a cable into the small harbour of Djupivogr, on account of many rocks in its vicinity and its being the anchorage of the small vessels frequenting the coast, we sought for a more suitable landing-place higher up the fiord, and succeeded in finding an excellent bay, called Gautavik, on the north shore, five miles from the entrance. A depth of near 30 fathoms can be carried in from sea to within a quarter of a mile of the shore, while the bay itself afforded good protection and

anchorage for any large ships that might be employed in the undertaking.

" High water at Djupivogr at 3 o'clock, full and change; rise 6 feet. The tide has been known to rise $6\frac{1}{2}$ feet before the coming of easterly gales; about the same time flood outside runs S.W. (true), ebb N.N.E., between Papey Island and the main. The strongest known stream has 4 knots, but the average in ordinary spring tides is not more than $2\frac{1}{2}$ knots.

" In 1860 drift-ice appeared off the coast and entered the fiord, and again (though in very small quantities) in 1859-60 (sic). This ice, called here Greenland ice, is the ordinary washed and decayed floe-ice, and comes from the north-west. *No icebergs have ever been seen on the coast.* The drift-ice appears with northerly and departs with southerly winds, and less of it comes into Beru Fiord than any other fiord on the east coast of Iceland; the residents accounting for this fact by Beru Fiord having a south-west direction, and is consequently protected by the more northerly and projecting capes which shunt the ice off, while the local tides keep it drifting up and down the coast. The fiord itself never freezes, but thin ice has been known to cover the harbour off the factory for a day or two during the winter.

" A tolerably complete survey of the fiord from the entrance to Gautavik was completed, but a further examination would be advisable outside, to ascertain the proper channel in which to lay the cable. The greatest difficulties experienced on the coast by seamen, are from the prevalent fogs during the summer months, and with easterly winds, *and this would render it advisable to start from this coast towards Færões*, in laying the cable, because making a good landfall here would be attended with considerable uncertainty." Finally, as to the practicability of Beru Fiord, Captain Young says, " There will be no difficulties from the sea, ice, or otherwise, and the only obstacles will be from fogs and thick weather, but which may be overcome by selecting proper seasons, and taking precautions in landing or embarking the telegraph cable."

Reikiavik.—Captain Young sailed from Beru Fiord on the 17th day of August, and arrived at Reikiavik, the capital of Iceland, on the 21st day of August, and after making inquiries as to the coasts, he says, " I then determined to examine Hval Fiord, as from its situation it appeared to have the advantage over any place in Faxø Bay, and on the 27th I proceeded up that fiord, sounding it as far as ' Maria Havn,' a small harbour and salmon river on the south shore, 7 miles from the entrance of the fiord. The least depth of water in the

channel of the fiord is 14 fathoms, with deeper water both outside and in, the general depth being 18 to 20 fathoms, soft mud. The cable could be taken into Maria Havn through soft mud, on a sandy beach in a landlocked position. Hval Fiord is protected from a heavy sea breaking into it by the shoals of 'Vesthræm' and 'Sydhæraun' in Faxø Bay, and on which there is less water than in the shoalest part of the channel of the fiord. The bays in the fiord are sometimes covered with thin ice, but the fiord itself never freezes; and with reference to drift-ice on this part of the coast, I cannot do better than quote the words of Sir Leopold McClintock. 'Faxø Bay never freezes over, and I can find no record of drift-ice within, since 1683. Merchant-vessels come and go throughout the winter.'

GREENLAND.

The *Fox* left Reikiavik August 31st, and after a very rough passage arrived at Frederikshaab October 2nd. Captain Young remained there to make some necessary repairs, and finally arrived at Julianshaab on the 22nd October. He then reports:—"Having made all inquiries about Igalikko or Julianshaab Fiord, I deemed it advisable at once to commence a survey of this beautiful arm of the sea, and acting upon the opinion of Colonel Shaffner, that were this fiord found practicable, the electric circuit from Reikiavik would not be too extended."

Julianshaab Fiord.—"We first sounded up to the head of the Fiord, which gave an opportunity for our landing a travelling party, under command of Dr. Rae, to examine the inland ice and nature of the country. A party also went to the Old Nordisker Ruins, at Igalikko." Returning with the *Fox* to Julianshaab, October 27th, Captain Young then surveyed the estuary of the fiord, and from the soundings obtained, says, "I am of a decided opinion that a depth of not less than 150 to 160 fathoms can be carried from the middle of the fiord abreast the settlement, out to sea, with a general muddy bottom."

"The depth of water will effectually preclude injury to the cable from the largest icebergs ever seen upon the coast. Although many bergs lay along the coast, we saw none aground in this valley of the fiord, nor, according to information obtained from the residents, have they been seen grounded in that channel." Captain Young then proceeds to say—"This report and my previous letters will show that my decided opinion (so far as we have been upon that route) is favourable to the practicability of the undertaking, and that Julianshaab will, under all circumstances, be well adapted for the reception of the cable. With regard to the operation of laying the cable, I

consider that no apprehension may be felt on that point; for, from the sudden disappearance which we witnessed of the ice from the coast, and from the ice *usually* dispersing from the south-east shores of Greenland in the autumnal months, opportunities will always occur when a ship having the cable on board, and lying in readiness in Julianshaab, may depend upon having a period of clear and open sea. *The cable once laid, no drift ice can in any way injure it, if the proper precautions are taken in securing the shore end."*

Ice of the Greenland Seas.—"Since my arrival I have seen the admirable remarks of Mr. J. W. Tayler upon the southern coast of Greenland, the results of his experience during seven years' residence there. His opinions must be most satisfactory to you, and I am sure that all who are interested in the work must be grateful to him for having so freely given them.

"I perfectly coincide with his views with regard to the size of the icebergs frequenting the above coast and accompanying the Spitzbergen drift-ice; and as this bears upon my own opinion, that no iceberg will ground in the channel of Julianshaab Fiord, I think I may here explain my reasons for this statement. Having navigated the entire west coast of Greenland, and into all the principal settlements, and having experienced a whole winter's drift in the ice, through Baffin's Sea and Davis' Strait, I have had occasion to remark and to gather all possible information upon the ice movements.

"Around the coast of Greenland, westward of Cape Farewell, there are two distinct descriptions, or rather kinds, of drift-ice ever approaching, but never meeting together. The first is the ice formed during the winter on the vast area of Baffin's Sea and the different channels from the Polar Seas westward of Greenland. This ice, called by the Greenlanders *the west ice*, often blocks up throughout the year the upper part of Melville Bay, and drifts constantly throughout the winter and early spring to the southward, through Davis' Strait, into the Atlantic. It seldom comes in contact with the coast of Greenland below the parallel of Disko, *and there is always an open sea between it and Greenland as far up as Holsteinberg throughout the winter.* The second is the Spitzbergen, called also the 'store ice,' which, as has been shown, comes down the east coast of Greenland, around Cape Farewell, and is carried by the current up the west coast, at times even to the Arctic Circle; but by which time it is usually pretty much broken up, and, if not entirely dispersed, the last remnants are supposed to return southward, by Davis' Strait, to the Atlantic—so near these two great ice streams approach, that vessels bound to the colonies have in the early spring

passed up Davis' Strait with the west ice and the Spitzbergen ice on either hand. But as there are two kinds of oceanic ice, so also are there two distinct classes of icebergs, namely, the bergs from the stupendous glaciers far up the west coast of Greenland, and especially in Melville Bay; these bergs attain an astonishing magnitude, but like the west ice, which they accompany or outsail, they do not come upon the west coast of Greenland below the same parallel, although in exceptional seasons of violent gales, such as the last, they may be blown in upon the land a little more to the southward; and I saw some of these *ice islands* last October aground, upon and near Tallert Bank, northward of Fredrikshaab. The other icebergs are those which accompany the Spitzbergen ice, and may be said to follow its movements. They are launched from the glaciers far up the east coast of Greenland, and from those in the island of Spitzbergen; and besides being originally far less in their dimensions, they are exposed during their long passage southward to the warmer Atlantic winds and heavy swells, and are proportionally reduced before their arrival at Cape Farewell. The bergs from the southern glaciers of Greenland are but small, and need scarcely to be taken into consideration; for, as they must come out from the heads of the fiords, they surely would not take the ground in again entering the *channel* of the deepest fiords.

"With regard to the flotation of ice, it has been calculated that seven-eighths of a cubical mass of ice will be immersed; but icebergs being very irregular in their formation, and having usually very peaked and angular summits, whilst below the water they are smooth, rounded, and most frequently widened out, I think that icebergs are not found that draw more water than the proportion of six feet below to one foot of perpendicular height above the water. Therefore in 150 fathoms of water (the very least found in the entrance to Julianshaab Fiord) an iceberg of an elevation above the water of 150 feet, or having an entire perpendicular height of 1050 feet, will there be suspended above the ground, and such bergs are not to be met with in that place."

Remarks upon the Seasons.—"The finest months in the Færøes are June and July, and in these months only should the cable be laid, and then about the last quarter of the moon, because the tides are greater at the full than at the change, consequently the neap tides immediately after the last quarter should be selected, as the currents are then inconsiderable. I have already given my reasons for recommending that the cable be laid from Iceland towards the Færøes, not only on account of the prevailing fogs on the east coast of Iceland, but also from the greater facilities for making the

coast of the Færøes, and the opportunity that the comparatively speaking shallow water off the north-west coast would give of shipping and buoying the cable in the event of a sudden gale of wind occurring at the time of laying it. The finest months upon the east coast of Iceland are also June and July, but I was informed that the weather is clearer earlier in the season, in the months of May and June—I suppose from the alternations of temperature being then less frequent. A few hours, however, of clear weather would always carry a ship beyond these mists, which usually hang only on the land. With reference to Faxø Bay station, the west coast of Iceland is generally free from fogs, and the gulf stream which sets round Cape Reikianess, and appears to keep up a continuous flow around Faxø Bay to the northward, passing out by Snøfellsness, also appears to considerably affect the climatic condition of the west coast. Navigation is open all the year round, and the operation of bringing the cable here can be timed to the opportunities for departing from Greenland. A fine pyramidal beacon has lately been erected on the Skagen, and is of great assistance to navigators entering Faxø Bay from the southward."

Conclusion.—Before concluding, it is proper to state that the voyage was one surrounded with much peril, on account of the succession of gales and the extraordinary quantities of ice found in the Greenland seas; never within the memory of man has there been so much and so long a continuation of ice upon the Greenland coasts as during the past year. In the arduous labours of the voyage Captain Young was most ably assisted by Mr. J. E. Davis, Master in the Royal Navy, who by the kindness of Captain Washington, Hydrographer to the Admiralty, was permitted to accompany the expedition and take part in the necessary surveys; and his former well-known services under Sir James Ross in the Antarctic regions, and great experience as a marine surveyor, enabled him to render the most valuable assistance in the especial mission of the *Fox*, which is acknowledged by Captain Young in his report in the highest possible terms. During the voyage various specimens of deep interest to the geologist and naturalist were collected; a large number of scientific observations were made, and a detailed meteorological journal was kept, which, together with other valuable information and an extensive collection of photographs, made with great zeal by Mr. Woods, under very difficult circumstances, have been furnished by Captain Young and Dr. Rae to the promoters of the enterprise, with the hope that they will be found to contribute to the cause of science, as well as to the immediate object for which they were made. Time will not now

permit me to give further details of this most interesting voyage ; but any members of this Society who may desire to make personal inspection of the charts, meteorological tables, logs, reports, and specimens, will be gladly permitted to do so.

Having thus presented to the Society some of the most valuable and interesting portions of Captain Young's report, I have only to observe, that the result of the recent survey has been to remove from my mind the apprehensions which I previously entertained in common with many others, as to the extent and character of the difficulties to be overcome in carrying a line of telegraph to America by the northern route.

Prior to the dispatch of the surveying expedition we had no knowledge of the depth of the seas to be crossed, with the exception of the few soundings obtained by Colonel Shaffner in 1859, and our information as to the nature of the shores of Greenland in regard to the requirements for a telegraphic cable was equally small.

These points are of vital consequence to the prospects of the North Atlantic Route, and the survey has placed us in possession of satisfactory particulars respecting them. The soundings taken by Sir Leopold M'Clintock will be a guide in the selection of the most suitable form for the deep-sea lengths of the cables, while the information furnished by Captain Young will direct the construction of the more massive cables to be laid in the inlets of the coast. It is not necessary to determine upon the precise landing places and other points of detail in connection with the enterprise at the present time, but the promoters of the undertaking have received ample encouragement from the survey, and from the testimony of competent and experienced voyagers and sojourners in the countries to which the line is to be carried, to warrant them in proceeding with their labours with renewed vigour and confidence. When they have achieved that success which their perseverance and energy deserve, I am sure they will always gratefully remember that their endeavours at the stage of their operations which is now under discussion would have been very much less productive of good results, but for the patriotic foresight of Lord Palmerston in ordering the *Bulldog* on her late successful service ; and for the assistance of Sir Leopold M'Clintock, Captain Young, Dr. Rae, and the Commissioners appointed to accompany the *Fox* by the Danish Government, as well as others who took part in the cause, whose patience and devotion to their self-imposed work have been above all praise. Nor can those interested in this important undertaking forget the great assistance which has been rendered to them by the Royal Geographical Society.

The third Paper read was—

3. *Exploration of the Faröes and Iceland, &c.* By DR. JOHN RAE,
F.R.G.S., commanding the Land Party.

THE FÆRÖE ISLES.

AFTER a passage of fourteen days from England in the screw yacht *Fox*, we arrived, on the 3rd August, at Thorshaven, the capital of the Færöes. It contains about 900 inhabitants.

On the day following Colonel Shaffner, Lieutenant Von Zeilau (Danish Commissioner), and myself, accompanied by two Færöese as guides, commenced a journey over Stromöe, our destination being Haldervig, a village near the northern extremity of that island. Our course for the first two miles was w.n.w., over the shoulder of a hill (named Klubbin), the height of which about 50 feet below its summit was 1048 feet; we then turned more to the northward until we reached the high land immediately south of Kalbakfiord, 1408 feet above the sea level. The walking round the head of this fiord was fatiguing in consequence of the unfinished state of the path. At the end of five hours we reached the top of the pass overlooking Kollefjord, having an altitude of 1179 feet. When we descended to the valley we took up our night's quarters at the house of Mr. Dam, a farmer, who gave us a hospitable welcome and provided us with a good dinner of fish, dried mutton, ham, cheese, butter, milk, cream, and coffee. Next morning I ascended a hill named Skarling, said to be the highest on Stromöe. Strong squalls of wind, with heavy rain changing into snow as we neared the summit, made the climbing difficult. The barometer indicated a height of 2506 feet. The Colonel had in the mean time travelled along the path a distance of 5 miles to the house of J. C. Jacobson, where we joined him. We were again hospitably entertained, and after remaining an hour we resumed our journey. Our active guides led us by the shortest but the most difficult of two routes, the highest point of which was 1711 feet above the sea. We arrived in the afternoon at Qualvig, a village having 132 inhabitants, where we passed the night. Next morning we traced back the more level but longer route between Qualvig and Kollefjord. We found its highest point to be 1275 feet at $2\frac{1}{4}$ miles' distance from Qualvig. The hill is not too steep for loaded ponies. We hired some of these excellent little animals for the purpose of testing their qualities. They were strong, sure footed, and carried with ease a man weighing over 15 stone. From Qualvig to Haldervig the distance is 9 miles, and the path lies close to the shore all the way. We found the *Fox* at Haldervig.

The formation of the island of Stromœ is almost wholly basaltic, with an occasional thin stratum of red tufa. Opals are found in the hills north of Kollefjord. No difficulties of importance present themselves to the placing of a telegraph line over the route examined, which is about 27 miles in length. At three points of the line some expense would necessarily be incurred in improving the paths, so as to make them more easy for loaded ponies to travel over. These places are the ascent of the high grounds north and south of Kalbakfjord, the descent to Kollefjord, and the height between Kollefjord and Qualvig.

The inhabitants generally appear to be well educated and religious, and so fully aware of the advantages they would derive from a telegraph being carried through their island, that they would use their best efforts to protect it from injury.

Labour is comparatively cheap, the average day's wages being about 1s. 4d. sterling. Our guides were well pleased to receive 2s. each per day.

The climate is not well suited for the growth of grain, but small quantities of barley and oats are raised, and a few potatoes, turnips, and other vegetables are cultivated. The live stock of the farmers are sheep, horned cattle, and ponies, sheep being the principal and most valuable productive source. The population of Stromœ is upwards of 2600. The chief exports are wool, woollen goods, eider-down, fish, ponies, and oil. The inland transport is principally by pack-horses.

Two small bays, the one a short distance to the south of Thors-haven, the other at Haldervig, having been examined by Captain Allen Young, were found well adapted for the landing of a telegraph cable; and the route examined by me overland forms the connection of the projected telegraph.

The sound separating Stromœ from Osterœ offers great facilities for the transport of materials, as it is navigable throughout the whole length, with the exception of about 100 yards near Qualvig, for vessels of ordinary size. The arms of this sound, namely, Kalbakfjord, Kollefjord, and Qualvig Bay, afford good anchorages and approach at three points to within a quarter of a mile of the projected route.

ICELAND.

The *Fox* reached Berufjord, on the east coast of Iceland, on the afternoon of the 12th, and anchored in the harbour of Djupivogr, near the entrance of the fjord. From this place the land expedition resumed its labours to travel across the island to Reikiavik. About fourteen horses, and two men to act as guides and pony-drivers,

were required. We had two very zealous auxiliaries in the persons of Mr. Weywadt, the Danish merchant, and Lieutenant Von Zeilau, both of whom exerted themselves to procure the necessary assistance and accommodations for the journey. Only eight ponies, exclusive of those of the guides, could be obtained at prices varying from 2*l.* 12*s.* to 5*l.* 10*s.* Hoping to complete our number of ponies on the way, we left Djupivogt on the afternoon of the 15th. With the exception of the guides, our party was the same as that when travelling across Stromöe. Our path ran along the south shore of Beruford, and was rough and stony. It was getting late when we reached the head of the fiord, a distance of only $9\frac{1}{2}$ miles in a straight line; so we proceeded to the pastor's house, which we made our home for the night. This worthy man, Sira Hosias, who had been to Djupivogt, overtook us as we were dismounting at his door, and gave us a hearty welcome.

It was difficult to make an early morning's start. Our horse-drivers were active and willing enough, yet we could seldom get away before eight or nine o'clock. A lamb was bought for 2*s.* 3*d.* sterling. After taking an observation with the barometer we resumed our journey, and ascended to the tableland west of Beruford by a series of four steps. The path, which is formed among stones, gravel, and earth, might be much improved by a very little labour. Two observations for altitude were obtained: the first about halfway up, giving 891 feet; the last near the top, 1282 feet, at which the latitude $64^{\circ} 49' 3''$ N. was also observed.

From this point our path lay nearly due north for 8 miles to a small lake, 426 feet above the sea level. After travelling 7 miles farther in the same direction we arrived at Thingmuli, and took up our quarters in the church, where we found ourselves very comfortable. The clergyman, Sira Biarni, was a kind and good man. A strong horse suitable for either pack or riding was bought here for 3*l.* 8*s.*

Our course for 5 miles was north, along the slope of a hill. We then travelled west until crossing the ridge, when we turned to the south-west, and reached in a short time Hallormstadr, on the banks of Lagar Flot. Hitherto we had been surrounded by a dense fog, which we emerged from on descending the hill. We here allowed our horses to feed for an hour, and an observation with the barometer gave the altitude of our position 528 feet; that of the river, which was upwards of a quarter of a mile distant, being 90 feet lower. This river has its source in the Vatna Jökul, and the muddy and white colour of its water indicates its glacier origin. As far as we could see to the northward the river widens into the form of a narrow lake.

having little or no current. This was the case we were told for 30 miles or more. As we rode to the southward along the stream we passed through a grove of small birch trees, many of which were from 16 to 18 feet in height. At 4 miles above Hallormstadr the lake-like river ends, and 4 miles farther up we came to the ferry. The river was here about 170 yards wide, the current strong, and the water so deep from the recent rains that the horses had to swim when crossing. The ferry-boat carried us all over with the baggage at two trips. We walked to the parsonage of Valthiofstadr, 2 miles distant, and met with a most kind reception from Sira Pietra. Taking the direct route to Valthiofstadr, it may be reached in one day from Berufjord, as the distance is about 26 geographical miles, and we learned that the road was not bad.

The morning of the 18th was very beautiful. Our horses having strayed during the night, we were detained some hours. We here bought another horse for 2*l.* 14*s.* After riding 8 miles along a fine level path, we turned to the north-west and commenced the ascent of a steep hill, up which we had not gone half way before we were in a thick fog. Fortunately we had engaged a guide, otherwise it would have been difficult to have kept the proper track. It was half-past nine and very dark when we arrived opposite to Bru, where we had to cross a river on one of those curious swing-bridges before reaching the house. This conveyance was about 2 feet 6 inches long, 2 feet wide, and 2 feet deep, suspended by pulleys to two ropes, which stretch over the river at a height of 30 feet above the stream, which is about 70 feet wide.

Our day's ride had been long and fatiguing, but there were only two parts of the road by any means difficult: the first being the ascent of the hill in the early part of the day already mentioned, and the other where we descended to a small stream, about 7 miles distant from Bru. In both instances the ground is of such a nature that the paths are capable of easy improvement. The heavy rains had made a portion of the road rather swampy.

Sunday, 19th.—Taking with us a guide, we started for Mödrudalr. For 12 miles our course was north; we then turned to the westward, which we kept all the way to Mödrudalr, where we arrived at half-past six. The roads were good throughout the day's journey, and we passed great quantities of dwarf willow; at 8 miles from Mödrudalr we traversed a perfectly desert plain, flat as a bowling-green, and covered with black sand and gravel, the débris of lava. Sigurder Jonsson, the owner of the comfortable farm-house, gave us a most hearty welcome. The farm is extensive, and produces an excellent crop of grass and quantities of dwarf willow, which, when

cut and dried, furnishes excellent fodder for both sheep and cattle. Mr. Jonsson possesses 600 of the former, three or four of the latter, and a number of horses.

Mödrudalur is situated in a beautiful plain, extending to a long distance north and south. Far to the south, at least 45 miles off, you see one of the peaks of Vatna Jökul, having a deep snow-filled cleft in the centre. Within 15 miles to the south-west is Herdubreid, one of the highest mountains in Iceland.

20th.—In company with a Mr. Skulason, who was going in the same direction as ourselves, we left Mödrudalur at nine A.M. Our course during the whole day's travel was north, with a very little westing. The road was good, and we arrived at Grimstadr, 25 miles distant, at half-past two P.M.

21st.—Mr. Skulason still gave us the advantage of his company. We arrived at the ferry on the Jökulsa Axarfiordr at 9.15 A.M., which is 4 miles from Grimstadr. The river is 150 yards wide, the water deep, and the current very strong. The horses had to swim about half the way. We crossed in a boat. The banks of the river are of fine black sand. The water was white and muddy, bearing the characteristics of a river that has its source from a jökul, or glacier. Its west bank is 951 feet above the sea-level. When we had ridden 16 miles from the river we arrived at an immense bed of very rugged lava in a valley to our left, and in one place there was an appearance as if it had filled up the bed of a river. We rode for 7 miles along this lava and then turned aside to visit a number of boiling mud-springs.

Before reaching Reikialith we had ridden among or close to the most recent lava we had seen. The only object I could compare the rough lava beds to, except in colour, was a field of ice that had been floated at high water to a low flat beach, covered with large boulder rocks, which, when the tide ebbed, broke up the ice into all sorts of forms. Reikialith is situated on the shores of Myvatn (Lake), which is very irregular in form and studded with rugged lava islands. Our course to-day was nearly west, and the distance travelled fully 30 miles.

22nd.—The first portion of the route was crooked, to avoid holes in the lava which were overgrown with moss and grass. A ride of six and a half hours, including an hour of stoppage to graze horses, brought us to the ford of Arndisarstadr, on the Skialfandafiot. It was about 100 yards wide, 2 feet deep, the current strong, and the water white and muddy. We reached the house of the worthy pastor (Sira Pallson) at Hals in the evening.

Hals is in lat. 65° 44' N., and was the farthest north point reached

by us. I learned that, during the winter, snow occasionally falls to great depth, and is blown into deep drifts. The cold is not usually severe, the lowest temperature being 20° or 21° below zero of Reaumur, equal to 13° or 15° below zero of Fahrenheit, and this occurs but rarely.

Thursday, 23rd.—We resumed our journey, having with us Mr. Eggerd Olafsson, a young student, who most obligingly offered his services as guide. After travelling south 2 miles along the small river that flows northward past Hals, we forded the stream. We crossed to the west the ridge of hills, about 1900 feet high, that lies between Hals and Akreyri. This last-named place is next in size to Reikiavik. As soon as we appeared from under the fog on the hill side, the twelve vessels at anchor in the harbour hoisted their colours. Akreyri is built at the head and on the west shore of Eyjafjord. Its harbour is sheltered by a spit of land that runs half way across the fjord where its width is about a mile. From the beginning of November to the end of March or April the navigation is usually closed by ice; but during the summer months there is considerable trade at this place. The valley is one extensive and productive grass meadow running southward for nearly 30 miles, on which a great number of persons were occupied haymaking. The river I found to be navigable for boats drawing about 2 feet of water, to the distance of 25 or 30 miles: its width varies from 25 to 80 yards. The path was good and level, fitted for a waggon in summer or for a sledge in winter.

Early in the evening we came to Saurbær, and were most cordially welcomed by Sira Thorlacius, a clergyman distinguished for his goodness and learning. We here made our arrangements for the next three days' journey, which lay through an uninhabited part of the country. The guide lived at some distance, and our young student rode to his house and engaged him.

24th.—From Holar the path led us south for four miles along the east bank of the stream; we then commenced an ascent of the high grounds in a south-west direction. The hill was 2868 feet in height, being the greatest altitude we had yet passed over. We reached the top in an hour and a half: although the road was now pretty level and many of the larger stones had been removed to one side, the path was not good enough to permit us to ride fast.

We made many détours so as to avoid the rougher portions of the ground, but the general direction of our travel was to w.s.w. In the evening a thick fog came on, and as the cairns of stone set up as marks became less frequent, the guide lost his way, and I had to put him right by the compass. About half-past eight we pitched

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ing wet, we had a boat brought across and were ferried over. r permitting the horses to feed for an hour and a half, we tra- ed westward for five miles round the base of the craggy and lofty ell. We now passed over a ridge 400 feet higher than the ferry he Hvita.

rom this point we had a very extensive view of more than fifty s down the valley of the Hvita, with its numerous lakes and ing springs—the clouds of white vapour from the latter indicating r positions. We now made a south course, and at the end of en miles again came to the banks of the Hvita, along which we nd an excellent path, over which we trotted at a great rate until e, when the guide again lost his way and left us at a good grazing ace to search for a house in the neighbourhood.

27th.—After waiting until half-past eleven in vain for the return f our truant guide, we unpacked our tent and lay under it, having o poles to pitch it with. The guide joined us at five in the morning. He said he had wandered about all night in search of his friend's house, which was within less than ten minutes' ride of where we were. We reached Haukadalsr at a little before six and took up our quarters in the church, where we had a good and substantial break-fast.

We then rode forward to the Geysers, where we found Lord Milton encamped. We collected specimens and sounded a Geyser, obtaining 78 feet depth. The barometer gave the height of the position 626 feet above the sea in latitude by observation $64^{\circ} 18' 16''$ N.

Our breakfast at Haukadalsr had not been so superior as to prevent us enjoying the good things that Lord Milton most kindly invited us to join him in partaking of, and after a parting glass of champagne with his Lordship we rode for sixteen miles farther on our way to Reikiavik, and then took up our night's quarters at Laugarvatn. Near this house are several boiling springs of very pure water, which are used for cooking.

We arrived at Reikiavik at eight o'clock on the morning of the 29th August, all well, but our horses very much used up by a journey of nearly 450 statute miles.

The results of this journey went to prove that there would be no serious difficulty in carrying a telegraph across Iceland by the route travelled over. Doubtless considerable expense would be incurred in repairing the old paths so as to make them more easy for loaded pack-horses, and in making new ones to shorten distances; but this work will be materially facilitated, as the Icelandic Diet has appropriated a considerable amount of money to be paid annually for this purpose. The six largest rivers that we crossed had high well-

defined banks, that showed no indication of ice action or of changing their position.

A shorter and in every respect a better route across Iceland for telegraphic purposes than the one described is that marked on the chart in a dotted line. This route, from Beruford as far as Mòdrudalr, in latitude $65^{\circ} 17'$ N., longitude 16° W., is nearly the same as that followed by us. From this point, instead of running northward, it strikes nearly west for 45 miles over what is said to be not a difficult country, to Isholl, a farm on the Skialfanda river. Following up the west bank of this stream to near its source, you cross the centre of Iceland in a south-westerly direction, by the Sprengisandr road, until you fall upon the head waters of the Thorsa. Trace this stream to south-west, keeping on its left bank to avoid the numerous jökul streams that enter it on the right, until reaching latitude $64^{\circ} 20'$, where the river would be crossed. The course then would be west to the Hvita and the Geysers. On nearly fifty miles of this route there is little or no grass, but depôts of hay can be established. Having measured on the charts four different routes from Beruford to Reikiavik, the distances are about as follows:—

	Geographical Miles.
Route travelled over, cutting off several unnecessary détours ..	310
By contemplated telegraph route, <i>via</i> Sprengisandr	250
In a straight line, keeping north of Vatna Jökul	210
Along south shore of Iceland	260

The modes of transport through Iceland are by pack-horses, wag-gons, and in winter on sledges. Of these the pack-horse is by far the most general. These little animals are remarkably sure-footed, and so strong that they can carry a load of 200 or 250 lbs. with apparent ease. They are easily kept in condition with no other food than grass or hay. Their prices vary from 2*l.* to 3*l.*, those for riding being more expensive. The pack-saddle in general use is an extremely primitive affair, the pads employed to protect the back from being injured being composed of turf which has been well dried, and a portion of the mould beat out of it. Boats might be used with advantage on some of the rivers.

The population of Iceland amounts at present to some 60,000; at one time it is said to have been as high as 100,000, but the ravages of epidemic diseases and other causes reduced the numbers to less than those at present on the island.

The masses of the people are able and active, harmless and honest. Wherever we went we were received with much kindness and hospitality, and even at the poorest cottages milk, coffee, and brandy were handed to us. All classes seem more or less educated, and

the Lutheran religion prevails. The chief occupations of the people are fishing and farming, both being combined when the farms are near the sea. The women spin, knit woollens, and weave cloth for home consumption. The farm live stock consists of sheep, ponies, and horned cattle; the two last are of small size. Of these, the sheep are the chief source of wealth. A farmer having 800 or 1000 sheep is considered wealthy. The usual food is mutton, fish (fresh and dried), rye-bread, butter, cheese, milk, one preparation of which, named *skuer*, is much used.

The price of labour varies from 1s. 2d. to 2s. 8d. per day, according to the season. During the haymaking, in the months of July, August, and September, it is highest.

Reikiavik, the capital of Iceland (a town of 1500 inhabitants), has been so often described by others, that it is needless for me to say anything on the subject. A little thin ice forms along shore near Reikiavik during calm weather in the winter time, but the first breeze of wind disperses it.

GREENLAND.

The *Fox* sailed from Reikiavik on the 31st August for Greenland. On the 2nd of October we reached Fredrikshaab. There are a Danish superintendent, a clergyman, and several clerks at this place, and about 200 Esquimaux. These Esquimaux are civilized; sober, honest, and faithful, apt and willing to be instructed—attentive to their religious observances, and thankful for kindness. The evening amusement was dancing. The principal food of the natives is fish, seal, whale, a few ptarmigan, waterfowl, including eider duck, with biscuit and coffee, imported from Denmark. Large quantities of a small fish (the kepling), called by the Esquimaux “*amaset*,” are caught in scoop nets in the summer and dried on the rocks. These are laid up for winter food and sometimes given to the cattle. After lying here eighteen days the *Fox* sailed on the 20th of October for Julianshaab, at which place she anchored on the evening of the 22nd. Julianshaab is one of the principal stations on the coast.

On the 24th I learned that it had been decided to sound and examine the Fiord of Igalikko, which ran by Julianshaab. During the time that the *Fox* would be employed on this service, which I was told by Captain Young might probably occupy four days, I thought with Colonel Shaffner that a short journey should be made to the interior of the country, for the purpose of ascertaining the practicability of travelling over it. The use of one seaman and a whale-boat was obtained from Captain Young to enable us to return from the head of the fiord to Julianshaab. Four Esquimaux women were engaged

as rowers. At 16 miles inland from the fiord a heavy fall of snow stopped farther travel. After an absence of four days we returned to our boat, but found that the fall of snow, followed by unusually cold weather, had already caused the fiord to freeze up for many miles. We had enough of provisions, and were supplied with some excellent fresh mutton, milk, and butter by an Esquimaux that lived in the neighbourhood, to whose house we removed. The frost continued for several days with unusual severity, and made the ice strong enough to enable Captain Young (after coming half way up the fiord in a boat) to travel over the ice with a sledge party from the *Fox* to our relief. Another party of men, sent by Superintendent Möller from Julianshaab to aid us, arrived at the same time. We all returned next day (the 6th) to the *Fox*.

At Julianshaab, as at Fredrikshaab, nothing could exceed the kindness and hospitality of the resident Danish gentlemen. Mr. Möller, the superintendent, Mr. Höyer, his assistant, the doctor, and others vied with each other in paying us attention.

The chief exports of the place are whale and seal oil, fox skins (blue and white), bear skins, and eider down. A few cattle, goats, and sheep are kept. The hay is usually collected at the summer encamping places of the natives, and must be very nutritious, as I was informed that one small cow during the past summer had not only yielded sufficient milk and cream to supply the family, but also to make eighty Danish pounds of butter. The natives here, as at Fredrikshaab, are honest, docile, and well conducted, doing great credit to the Danish government. The prevailing form of worship is the Lutheran.

The result of this expedition, as far as regards the land portion of it over the Færøe Isles and Iceland, was extremely favourable to the practicability of laying down or erecting a telegraphic wire. The question in Iceland will be, whether the telegraph should be carried across the whole island from Beru Fiord to Faxø Bay, or only from Portland Bay to the latter place. The latter will reduce the distance on land from about 250 to 90 miles.

The fourth Paper read was—

4. *Fiords of South Greenland.* By J. W. TAYLER, Esq.

THE land of Greenland is very elevated, the average height of its mountains being not less, perhaps, than 1500 feet, and in some places exceeding 6000 feet, above the level of the sea. It appears that at the time of the elevation of the west coast of Greenland, a chain of mountains of about 50 miles in breadth, running about

north and south, was acted on in a wave-like manner, *i. e.* leaving depressions nearly equal to the elevations, and more or less at right angles with the direction of the chain. These depressions or long valleys into which the sea runs constitute the fiords: they vary in breadth from 1 to 8 miles, and run up into the interior from 10 to 60 or more miles.

The scenery in these fiords is magnificent, perhaps unequalled. The lofty mountains—rugged, precipitous, and barren—with patches of ice (projections from the great interior glaciers), and snow unmelted by the summer's sun; with valleys half filled up by enormous angular blocks of stone detached from the sides of the steep mountains by the alternate frost and thaws; the solitude, and the almost total absence of life, animal and vegetable, make up a picture of indescribable desolation.

In other places the more rounded and sloping mountains are covered with green and yellow moss. Grass, heath, and wild flowers grow in the valleys; whilst in some still more favoured and sheltered dales, miniature forests of Arctic willow, six feet in height, are pointed out by the Esquimaux as proofs of the extraordinary excellence of the climate of Greenland and fertility of the soil. Of the latter material there is not, however, in many places sufficient to bury the dead, and they are compelled to place the body on the surface and form a grave by building up stones around it.

These fiords with grassy dales offer the most pleasant places of abode in Greenland; in fact, it is only to the more fertile parts of the fiords that the name of Greenland is at all appropriate. But these parts of the fiords form a striking contrast to the outer coast of Greenland.

The Danish settlements are mostly at the entrance of the fiords, for the convenience of seal-hunting and of shipping; but the old Scandinavians who settled in Greenland in the ninth century brought cattle with them, and therefore established themselves at the interior ends of the fiords and bays, where grass was to be found. The ruins of their habitations, constructed of very large blocks of stone, are still to be seen at all the more fertile places. Judging from the number of ruins and the accounts in the Icelandic Sagas, their number must at one time have reached about 10,000. But the Scandinavians of Greenland have perished; cattle no longer graze in the valleys as then; and some heaps of stones are all that remain to show the enterprise of those early western pioneers.

The Icelandic Sagas contain descriptions of most of the fiords of South Greenland and of the chief settlers in them. Perhaps the

most notable in this respect is the fiord of Igalikko. This fiord ends in two forks or arms: in the northern stand the ruins of Brattelid, the first town in Greenland, built by the first settler, Eric the Red, in 986; in the other was built the town of Garde, the residence of the Bishop of Greenland. These two towns vied with each other in the claim for precedence—Brattelid claiming it on the ground of its being the first erected, and the residence of Eric the Red and his descendants; whilst Garde asserted its superior worthiness in being the residence of the bishop. After much wordy quarrelling and sundry duels, Garde appears to have triumphed, and was henceforth considered as the capital of Greenland.

But Garde now shares the ruin and desolation of Brattelid, with nothing else to recommend it to our further notice. Not so, however, with its rival Brattelid. In the time of Eric the Red, A.D. 1000, there sailed from the fiord of Igalikko and from the town of Brattelid an expedition of discovery. These enterprising Scandinavians were not contented with having discovered the vast territory of Greenland; this appears to have only stimulated their thirst for further discoveries, and it may perhaps also be that, after two or three years' residence in Greenland, they found it was not the El Dorado they had dreamed of; however, the expedition sailed to the west and south, and finally discovered the continent of America. They found good prairie land, which they called Markland, and sailing on they came to a land bearing wild grapes in great abundance: this they called Viinland. They wintered in America, left some settlers (who after some time succumbed to the natives), carved their runics on the rocks, and taking in cargoes of timber and supplies of wild grapes, sailed the next summer and safely returned to Brattelid.

Thus the credit of discovering America is certainly due to the Scandinavians of Greenland. And Columbus, when he visited Iceland some years previous to his celebrated voyage, no doubt read the accounts of the discovery in the Icelandic Sagas. But as these accounts were suffered to remain almost unknown to the world, and as the navigators of northern Europe had in his time forgotten the route discovered by their more energetic forefathers not only to America but also to Greenland (which was then called the "Lost Land"), all honour is certainly due to Columbus for the re-discovery of America.

When Eric the Red first settled in the fiord of Igalikko, the Christian religion had not reached Iceland or Norway. Thor with his hammer reigned supreme. But Thor and his worshippers have sunk into oblivion, bequeathing us his hammer, the symbol of

industry. The fiords of Greenland are about to witness a new era of enterprise and engineering skill: ere long the North Atlantic Telegraph Cable will repose at the bottom of one of its fiords, again uniting with Europe the countries of Iceland, Greenland, and America.

In the neighbourhood of high land the water is generally of great depth, and the fiords of Greenland form no exception to the rule; in fact, it is only near the lower and more sloping land that vessels can lie at anchor, and this only in small coves so near to the land that it is the general practice to make fast to the shore by hawsers. Outside of this the water deepens rapidly, and in the middle of many of the fiords there is some 500 fathoms water. I should say that of the deeper fiords 300 fathoms will be found to be the average depth. In some places, where the rocks are nearly perpendicular, a fishing-line of 100 fathoms fails to reach the bottom within a few yards of the shore.

Looking at the map of Julianshaab district, you will see that some of the fiords terminate at the continental ice, whilst others do not reach it; the former fiords have glaciers, the latter have not.

These glaciers are the outlets of the continental ice, which has a motion from the interior towards the sea coasts; and as the deep valleys or fiords are the only outlets, the ice is forced into them until, by projecting from the land into the sea, or fiord, portions give way and break off, owing to not being sufficiently supported by being adequately immersed, or owing to the rifts and chasms which exist in the glacier. The larger of these portions, when thus detached from the glacier, constitute icebergs.

The glaciers in the fiords of the southern parts of the west coast of Greenland are not very large, and consequently their icebergs are never of great dimensions. I do not think any iceberg produced by the glaciers of the fiords within 100 miles north or south of Julianshaab would ground in 60 fathoms.

The glaciers bring down with them boulders, sand, and much fine clay, the result of attrition; the boulders are always rounded, owing to the severe abrasion they have undergone by being transported over the rocks below, whilst under the enormous pressure of the vast thickness of continental ice. This glacial clay floats suspended in the water, several miles from the glacier, rendering it turbid or milky, and depositing itself gradually throughout the whole length of the fiord. So vast has been the quantity, and so long the period of time during which this transport of clay has proceeded, that some fiords have been so completely filled up by it

that they are only navigable in boats of light draught and at high water.

From this choking up of the fiord the glacier has ended in being unable to longer launch its icebergs; it has, therefore, found a new outlet through some other valley, where it will repeat the process of gradually filling up the fiord.

As nearly all the fiords have, or have had, glaciers in them bringing down the clayey deposits I have mentioned, the bottom must be of soft material. If the cable be taken into a fiord having a glacier, I think the clay which will be gradually deposited over it will be of great service in protecting it from injury by marine animals or other damaging agents.

The existence of these fiords is extremely advantageous to the carrying of the telegraph cable to Greenland, and there bringing it on shore. Were it not for these, some difficulties might have been met with in finding a suitable place for the landing, owing to the ice-streams on the outside coast; but in several of these fiords, Tessermiut, for example, the water is of such depth as to preclude the possibility of icebergs grounding upon the cable, and the almost perpendicular mountains forming parts of the lateral coasts of the fiords, and the deep water at their bases, offer excellent situations for leading up the cable from the middle of the fiord to the shore, without exposing it in the slightest degree to the grounding of icebergs upon it.

In conclusion, I beg to state, that from the results of seven years' observation in Greenland, I am of opinion that neither the ice nor the configuration of the coast will offer any impediment to the successful laying and landing of the telegraph cable in Greenland.

The fifth Paper read was—

5. *Electric Circuits.* By Colonel T. P. SHAFFNER, of the U. S.,
F.R.G.S., &c.

LANDING PLACES AND LENGTHS OF CIRCUITS.

Scotland to Færøe Isles.—One end of the cable for this section will be landed in one of the many safe bays in North Scotland—the precise place has not been determined. The other end it is proposed to land in a beautiful bay near Thorshaven. This section will be some 225 miles, and the depth of the sea not exceeding 254 fathoms; bottom, mud and shells.

Færøes to Iceland.—One end of the cable will probably be landed at Haldervig, near the north of Stromøe Isle. Captain Young

strongly recommends this bay, and that the other end be landed in Berufiord, Iceland, a very good place, with deep water and muddy bottom. The cable to this place will be about 240 miles. Depth of sea, maximum, 683 fathoms, bottom mud and shells. It may be found more advantageous, for reasons not necessary now to be discussed, to carry the cable more westward, to or near Portland, and to which place it can be laid on a muddy and sandy bottom, in water of good depth. Both of these places, namely, Berufiord and Portland, are free from any volcanic influences whatever, and ever have been, as far back as the discovery of that remarkable island in the year 863.

Iceland to Greenland.—This section will be the longest of the series, between 600 and 700 miles. Captain Young has reported in favour of Hvalfiord, a little north of Reikiavik, in the Faxe Bay; but in order to economise as to length of cable, it is quite probable that a more westerly place will be selected, on the south side of Faxe Bay. The other end of the cable he recommends be landed in Julianshaab Fiord, on the south-west coast of Greenland. He examined that beautiful bay, and found it to contain deep water, with muddy bottom; and he states that it is his decided opinion that bergs cannot reach the cable when laid in it. The reports of others concur in this opinion. There are other fiords near Cape Farewell, equally favourable. Tessermiut and Illoa Fiords are considered well suited for the cables.

Heretofore it was contemplated to land this section of the cable upon the east coast of Greenland, south of latitude 61° north, in or near Prince Christian Sound, and then, either to carry the cable out at the other end of the sound, or to connect this section with the next by a cable around Cape Farewell; or, by a line across the land, avoiding the inland ice. For the present, the intention to land on the east coast has been abandoned, not because it has been found to be impracticable, but because it has not been proved to be practicable. It is now proposed to carry the cable from Iceland, around Cape Farewell, to one of the fiords on the west side, and from the same fiord run the cable to Labrador. Hereafter the Company may find it best to land on the east coast, and carry out the original intentions as above stated.

Greenland to Labrador.—The cable will start from Greenland, and land at or near Hamilton Inlet. The soundings taken by Sir Leopold M'Clintock show 180 fathoms interior from the outer rocks on the coast, so that the cable can be laid into the inlet from the sea in water sufficiently deep to place the cable beyond the reach of icebergs. If, however, the depths be found more favourable from

the sea into Byron Bay, near and south of Cape Harrison, that place will be equally satisfactory, all questions being considered; and from thence the cable can be carried into Hamilton Inlet, through one of the several channels connecting Byron Bay with the Inlet. Length of section about 510 miles.

Before the respective cables are laid, each of the places will be carefully sounded, and buoys will be placed indicating the deep trenches; and, besides, steam tenders will be in readiness to serve as pilots. Every precaution will be taken to obtain the most complete information with regard to the depths of the bays and of the sea.

The PRESIDENT.—The Society has heard, I have no doubt with much pleasure, the very interesting Papers that have been read this evening, and to afford an opportunity for a discussion upon them, their consideration will be continued at the next meeting.

ADDITIONAL NOTICE.

Additional Instrumental Instructions to Mr. Consul PETHERICK.

By F. GALTON, Esq., Hon. Sec.

The observations that it is absolutely requisite you should make, are—

1. You are earnestly recommended to use every opportunity of practising with your sextants *upon stars* while on the Lower Nile, and able to check your results with known latitudes; also to practise observing eclipses and occultations under the same circumstances.
2. As a general rule, observations should be made at marked points, such as the confluence of rivers, prominent hills, and native towns, rather than at mere encampments.
3. Reliable latitudes of different places on the White Nile between Khartum and Gondokoro, and on your further line of travel. The latitude of Gondokoro is especially desired, and the meridian altitudes of at least six stars; three north and three south should there be observed.
4. Longitudes by the exceedingly simple methods of the eclipses of Jupiter's satellites, or of occultations of stars, to be made at Gondokoro and at the furthest point of your travel, or at places adjacent to these. The local time should there be determined by more than one set of observations, to guard against error, and the method of altitudes on both sides of the meridian should always be used. Any longitude south of the parallel of the Bahr el Ghazal would be very valuable.
5. The elevation above the sea of the following places by observation of the temperature of boiling water:—Cairo; Thebes; Assouan; Junction of Atbara; Khartum; the capital of the Shilluk country; the river at a point opposite the Bahr el Ghazal; Gondokoro, and different stations on your further route.
6. The three boiling-point thermometers to be occasionally compared, and to be carefully preserved, with the view of determining any changes in their index errors. They are also to be compared with those of Captain Speke, in

the event of the hoped-for meeting taking place between you and that gentleman.

7. Simultaneous observations of the rise and fall of the Nile, at Gondokoro and Khartum, should be instituted, and also at as many other places as trustworthy observers may be found to make them.

8. It is of great geographical importance that the breadth, depth, and velocity of the Upper White Nile and its tributaries be ascertained, in order that their sections may be protracted, and the quantity of water that passes down them be determined. A few notes on practical methods of doing this will be prepared and given to you by Mr. George.

9. The compass bearing of marked hills should be frequently taken, and the position whence they are observed defined and laid down as unmistakeably as possible by cross bearing. Your course and estimated distances should be noted continuously day by day, and the variation of the compass frequently determined.

10. Time observations with your chronometer should be taken whenever latitude observations are made. These will serve to connect distant points whose longitude has been reliably determined by the rare occurrence of satellite eclipses and of occultations.

11. If any architectural monuments are met with, it would be important to take sketches and photographs of them, however rude; to make a general plan by measurement (for which a measuring-tape should be taken); and to note any peculiarities of construction or style, such as the use of the arch, the angles of the walls, doorways, and windows. If there be any inscriptions or hieroglyphs, they should be copied, or impressions taken of them, if possible, with coarse paper damped in water and pressed with a brush, upon the inscription. Any small objects of art or antiquity found amongst the natives should, if possible, be collected.

12. Every observation is to be copied from your rough notes into the Register-book which is supplied to you. Your entries, up to the last opportunity of communicating this winter with Khartum, to be forwarded from Gondokoro to the Secretary of the Royal Geographical Society.

List of Instruments and Books.

2 sextants; 1 artificial horizon and spare mercury; 1 chronometer; 1 telescope and stand; 1 prismatic compass; 1 lantern; 1 hypsometrical apparatus attached to the lantern; 3 W.B. thermometers and 5 ordinary ones; Nautical Almanacks, 1861, 1862, and 1863; calculated list of those occultations and eclipses of satellites which may possibly be available; Raper's Tables; Manuals, viz. 'Hints to Travellers;' books of blank forms and register-books; 2 measuring tapes (50 feet and 100 feet).

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.

SESSION 1860-61.

Sixth Meeting, Monday, February 11th, 1861.

LORD ASHBURTON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Rev. C. J. Fynes-Clinton and James Campbell, Esq., were presented upon their Election.*

ELECTIONS.—*Vice-Chancellor Sir John Stuart; and G. Cox Bompas; Charles Bonney; Thomas Combe; John Jermyn Cowell; Passmore Edwards; William Fairbairn; John Fleming; William Forsyth; William Bosville James; Hayes Kyd; William Robertson Sandbach; Peter Sharp, and James Simpson, Esqrs., were elected Fellows.*

ANNOUNCEMENT.—*The subscription list in aid of Consul Petherick's expedition up the White Nile, amounting already to upwards of 1000*l.*, was laid upon the table.*

ACCESSIONS.—*Among the accessions to the Library and Map-Rooms since the former meeting were Sir John Richardson's Polar Regions; Bombay Magnetical and Meteorological Observations; Mercantile Navy List for 1861; Du Chaillu's Western Equatorial Africa; Sketch of Country explored by Mr. J. M. Stuart; the Royal Illustrated Atlas, Parts 21 and 22; Keith Johnston's Royal Atlas, Part 8, &c.*

1. *Discussion on the North Atlantic Telegraph Papers.*

[*Adjourned from the last Meeting.*]

The PRESIDENT said he need not read over again to the Society the names of the very interesting Papers that were submitted to them on the last occasion of their meeting. There were now amongst them travellers who had gained experience in every quarter of the globe;—many learned geographers, who had been themselves present in those portions of the earth which had been alluded to in those Papers: and he trusted that they might have their assistance in correcting what they may have seen to be wrong; in amplifying and illustrating what they had heard. The subjects which come before the Society, within its province, are the geographical features; they were not engineers, nor electricians, to judge of the power of electric currents to pass from this or that part of the earth; they were not members of Parliament, who were to determine what aid, what facilities by law were to be afforded to men who had devoted themselves to this great enterprise; nor were they capable of judging of the respective merits of the many plans which had been put forward before

the public. All that they could judge of were the geographical facts which had been laid before them, and of those facts there could not be better judges than the assembly that he saw before him. It was, therefore, with hopes of receiving instruction and much knowledge, that he called upon those gentlemen, more particularly, who had been in these scenes, to give them the advantage of their experience, in either amplifying, correcting, or illustrating, the several facts which had been brought before the Society.

SIR EDWARD BELCHER took a very deep interest in the deputation to Lord Palmerston to get the expedition sent out for this northern telegraph; and he was very happy indeed to find that nearly all the arguments that were then used have been so thoroughly realised. He thought, in the first instance, as has been proved, that they should find a great connecting bank between Scotland and the Færøes, and between Iceland and Greenland. As to the difficulties which were raised with reference to the Labrador shore, he was very glad to find that the reefs, which it was said would entirely prevent any cable being laid across there, have vanished with the ice; they have gone southerly somewhere or other, and have not yet been found; at least those reefs that are there, are rather helps than otherwise by preventing the ice coming down upon the entrance. He should have liked very much to have been present at the last meeting to have understood the nature of the soundings;—and while speaking of the soundings, he was sorry to say that before another institution—the Civil Engineers—it had been assumed that surveyors like himself knew nothing at all about soundings—that they did not know their business, and that really some civilians would have to teach them their work. Now, as far as he was himself concerned, during the whole of his servitude he adopted a particular means for getting up the bottom in large quantities, and in such large quantities that he thought nothing of bringing up a hatful at a time. He had six cases of microscopic shells, a very handsome collection, all of which he had got up by that means. The very simple mode that he adopted to sink his lead and to get up the soundings from the bottom was this:—The sounding lead was encased by a cylinder, and the lead being conical, the cylinder on striking the ground flew up, then the lower part of the lead stuck to the bottom, picked up its quantity of soundings, and, as the lead was withdrawn, the cylinder slipped down and completely protected whatever adhered to the lead from being washed away. The other instrument which he used for obtaining shells was a small dredge attached to the lead, and as the lead struck the bottom, the flanges scraped up a quantity of earth.

MR. PLINY MILES mentioned one or two facts that he had noticed while travelling in Iceland a few years since in regard to its climate, whence it may be concluded that that country is not so cold as it might be imagined from its name and locality. The small hardy race of horses there subsist entirely out of doors in the winter, without any kind of food, in the shape of hay, being given to any of them, excepting only to those which they use for domestic purposes, during those months. The rest are without any kind of food, except what they gather from the open country. He saw in one case a mahogany tree on the shore, not far from Portland, on the south coast of Iceland, that had unquestionably floated with the Gulf Stream from the Gulf of Mexico itself. He was told also by Professor Johnson, that it was not unfrequently the case that spruce or other logs from Norway were found driven on to the northern coast, at the same time that logs of wood floated thither from the southern portion of the North American continent. They are there found together; the one current having come from Spitzbergen, and the other from the Gulf Stream. Standing on any mountain or height in Iceland, one sees a green and beautiful landscape; in fact, the natives say, "Iceland is the finest country the sun shines upon," though at some seasons of the year they have very little of the sun to shine. With regard to the absence or presence of trees in Iceland, that has nothing to do with the coldness or the severity of

the climate. It is well known that there are trees of large size on the coast of Norway, where the climate is far colder than in the most severe seasons that have ever been known in Iceland, or in regions still farther north. It is a fact, that on some portions of the coast of Scotland, and in all parts of the Orkney and Shetland and Færøe Islands, not a single tree 6 feet high will be seen, while they are found in Iceland 18 feet high. He would not attempt to explain why trees are found growing in one very severe climate, and not in others, but it is undoubtedly owing, to a certain extent, to the direction of the wind, and to the sea air. At any rate no trees whatever are found on some of our more southern coasts, while farther north, on the Labrador coast, there are large trees, spruce, pine, larch, and others. So that the fact that there are no trees in Iceland, must not lead persons to suppose that the cold is necessarily extremely severe. He would refer to a statement made by a gentleman, who read a Paper at the last meeting of the Society, with regard to the thickness of ice at Reikiavik. He had a distinct recollection that the lake spoken of is seldom known to be frozen to the depth of 18 inches. He had been told that sometimes it was not frozen more than 2 inches during the whole course of the winter, showing most conclusively the mildness of the climate.

CAPTAIN SHERARD OSBORN, R.N., would not attempt to say anything as to the practicability of the route, inasmuch as the distinguished travellers and navigators, who read their Papers at the last meeting, have given us sufficient authority to say that there were obstacles on the route undoubtedly, but that all those obstacles are surmountable. Touching the soundings, he would call the attention of the meeting to the agreeable fact that the entire line of soundings show that there is no depth greater than 1000 fathoms between Scotland and longitude 30° w. on the proposed route, or exactly halfway across the Atlantic Ocean. There are then two valleys of deep water, of small width, on either side of Greenland. The soundings diminish very abruptly as Greenland is approached, and shallow water will be found probably round Cape Farewell. With regard to the Labrador coast, the principal difficulty was in carrying the cable within the 150 fathoms of water, so that it might not be exposed to the action of the icebergs. He was sure that Arctic men all agree that 150 fathoms would be about the maximum draught of any iceberg, so that the chief object to be secured in placing the cable is to push the 150 fathom-mark as near into the coast as possible. They would remember that Sir Leopold M'Clintock had said that he would like to have a more accurate survey of the Labrador coast, so as to carry the deep water a little closer. If they looked at the map they would see 1190 fathoms carried just to the north of Hamilton Inlet, and there was every reason to believe that the bank of Newfoundland—they might call it so, although it extended a long way up the Labrador coast—deepened suddenly there. As far as one might speculate upon the question, he had no doubt that a more accurate survey would lead to the obtaining of such information as would give a channel leading close into the Labrador shore, near Cape Harrison. He would propose, that the cable there should open out and form, say, half-a-dozen strands running into the shore at certain distances from each other, so that if a berg drifted down and happened to pick up one, it would not pick up all the rest, and by that means the cable in the deep water would be at all times safe and recoverable by following out those strands. There was one feature that struck him particularly, and on which he wrote to Captain M'Clintock. No man would dispute that bergs of ice sounding the bottom would rip it up, just as a plough would a ploughed field; and that if that bank was thus ripped up by the flocs of ice, there would be hardly any animal or vegetable life upon it; it would be a kind of subterranean desert. Sir Leopold M'Clintock was continually dredging there, and in a note just received, that distinguished navigator said, "The bank of Hamilton Inlet has from 100 to 200 fathoms upon it. I am of opinion that icebergs which ever drift down there cannot possibly reach the b"

ground near the islands at the entrance and are not bergs of the largest size. Shells and other small things were brought up by the sounding machines in 40 or 50 fathoms, *as in other parts of the sea* where icebergs cannot possibly interfere with them." Near Fredericksaah Captain Sir L. M'Clintock says they dredged up in 26 fathoms, delicate corals and creatures which could not live at the bottom of the sea if much disturbed by icebergs,—and adds "*so much for the destructive propensities of icebergs.*" How all this came about was a question he (Captain Osborn) did not pretend to solve, but the fact was very curious, as showing that bergs could touch the bottom without sweeping everything before them. He was sure that every geographer would be interested in the following fact, for it related to the late Sir John Ross, who stated that in his voyage in 1818, he brought up mud from 1050 fathoms, the deepest soundings ever obtained at that time; and in the mud were shells and fish. So to that old navigator they first owed that the fact of animal life in great depths had been discovered. There were remarks at the last meeting about difficulties with regard to the intense cold and the aurora borealis affecting the telegraph. It might be interesting for the Society to know that a few seasons ago, Captain Kellett and Captain M'Clintock were beset in the ice in $74\frac{1}{2}^{\circ}$ N., and they communicated with each other by telegraph from ship to ship. Now $74\frac{1}{2}^{\circ}$ N. latitude was a long way in the Arctic zone, and the cable, the practicability of which they were at present discussing, would lie a long way without it. That telegraph was at work throughout the whole winter, and was not in any way affected by that terrible bug-bear the aurora borealis, nor by the intense cold experienced so far north.

MR. JOHN BALL said it was impossible to over-rate the importance of the subject brought to the attention of the Society by the gentlemen who had read their Papers. It was very desirable not to under-rate the difficulties which still remained, and which he thought had not all of them been sufficiently brought forward, for it was by pointing out the difficulties at this early stage that they would soonest arrive at the solution of those difficulties and the great end which, he trusted, they would live to see accomplished. He had long felt that this northern route was the right one; but he was not blind to the many difficulties which still remained in the way. With reference to the precise points which came particularly under the attention of this Society, and were brought clearly before them at the last meeting, there were two or three on which he wished to make a few observations. As to the Færöes, he apprehended there was no great difficulty. As to Iceland, it was proposed to land the cable at the south-east side of the island, to carry it across the island, and start again from Reikiavik in order to communicate from thence to Greenland. Now there, are they not unnecessarily encountering very serious difficulties and incurring a great increase of expenditure? It is true that it is possible to cross Iceland—perfectly possible—but so experienced a traveller as Dr. Rae found that it was not practicable without very great sacrifice of time, and encountering great difficulties, to take that direct route; but had he at all considered what were the difficulties and cost of laying down a telegraphic wire? He thought Dr. Rae had mentioned—every traveller in Iceland has mentioned—that large district in the interior of the island over which travellers must hurry as fast as their horses can carry them, for the simple reason that there is nothing upon which to live; and if they were to lay down a telegraph across that interior desert of Iceland, they must be prepared for a vast number of difficulties and an enormous amount of money, and time, and labour. But, furthermore, how is it to be done? If they required piles, they must carry every pile into the island, across the island by horses; and supposing they could hire every one of the horses in Iceland, there are not enough to enable them, in one or two seasons, to accomplish the work. And then, again, as to the difficulty with respect to the breakers. Would it not be better to confine the difficulties to one point alone—the entrance into the Faxa Fiord? He did not know whether it was pro-

posed to land the cable at that point or not, but let the difficulties be confined to one point instead of two. With reference to Labrador, even though it be true that they could carry the 150 fathoms depth near to the coast, still that might be as formidable as 10, or 20, or 50 miles in another place. If it be a part of the coast on which there are icebergs, it is necessary, as it appears to him, not only to carry the 150 fathoms of water close in shore, but also to get it safe behind some headland which will throw aside the icebergs. Might it not be possible that by making the line a little longer, and running it into the strait of Belle Isle, the true solution would be found?

SIR RODERICK MURCHISON would not have occupied the time of the Society for one moment, upon a subject of which he knew so little, if any Arctic geographer or voyager had been prepared to rise. He would only say he was one of the very many well-wishers to every expedition of this sort which the Royal Geographical Society holds within its number. They were not there, as the President very properly said, to discuss the engineering merits of the project, nor were we really capable of estimating the difficulties that had been apprehended by his friend Mr. Ball; but they were capable of estimating, in a very decisive manner, the facts that Sir Leopold M'Clintock and Captain Sherard Osborn, who are men of great experience as Arctic voyagers, have pronounced in favour of this scheme. He made no observations upon the scheme, except to say that had he spoken at their last meeting when the President adjourned the discussion to this evening, he should have felt it necessary to say, that they owed a deep debt of obligation to those five gentlemen who brought before us on that occasion their well elaborated Papers. They produced a mass of geographical knowledge which might never have been gained, had not this expedition been matured—he said it to his honour—through the patronage of Lord Palmerston, and carried out through the active enterprise of the gentlemen who undertook this service. Being in favour of all such expeditions, the moment his distinguished friend Captain Allen Young offered to go out in command of the little *Fox*, in which endeavour he took a deep interest, he went down to Southampton, to attend a great meeting assembled by the Mayor of that town in honour of this expedition. There Colonel Shaffner and Mr. Croskey, of the United States, and the other gentlemen associated with them, as well as the Danish officers present received from them as Englishmen, every encouragement they could offer to promote this enterprise. The details of the two expeditions have been so admirably laid before the Society that he, for one, should have been contented with the results, if he were in any way embarked as a speculator in the success of the undertaking. But not having any pecuniary interest in it, or in any rival speculation, he might say to the gentlemen of the North Atlantic Company, they had put their case so well before the public that no gentleman associated with other lines could say that they had not treated the subject in a most ingenuous and fair manner.

He could not sit down without saying that it gave him very great satisfaction to hear Dr. Rae expatiate upon the warm and hearty reception he received from the inhabitants of the Danish settlement of the Færøe Islands and of Iceland. He said this in the presence of the Danish minister; and he was sure Dr. Rae was justified when he spoke in the name of Englishmen, of their gratitude to the King of Denmark, and his Government, for having so warmly assisted them in one of those enterprises, which may lead them to connect America most directly with their own country.

DR. RAE said the time allowed him at the last meeting of this Society was necessarily so short, that he left unmentioned some important points connected with his journey over Iceland; so he now begged to say a few words in reply to the observations of Mr. Ball. The interior of Iceland over which they travelled was not devoid of grass, there being sufficient for their horses out the whole route, which offered comparatively few difficulties. Of the party were heavy men, they crossed the island &

riding the same horses at the rate of more than 30 miles per day. These ponies can carry a load of 200 lbs. or upwards, and pieces of wood 10 or 15 feet long can be carried by them over the highest and steepest ground on the route. The best line for the telegraph lies to the south of that they travelled over, and is marked on the chart by a dotted line. Along this route there is abundance of water, and grass also, except at one station, to supply which a dépôt of hay could be made. This portion of the way (about the centre of Iceland), called the Springisandr Road, is almost a flat table-land. Again, some of the larger rivers that flow northward appear to be navigable for boats similar to those used in Hudson's Bay, which carry from three to four tons weight. By this means materials could be deposited at several stations near to the proposed line. He did not profess to be a surveyor, but having travelled a good deal both in the United States and Canada, he had seen telegraphs carried over more difficult and rougher country than they encountered in crossing Iceland. But should objections be offered to carrying the telegraph completely across the island, he was of opinion, from information obtained, that Portland, in the south of Iceland, although no safe harbour for ships, would form a good landing-place for a cable. From Portland to Reikiavik the distance is not over 90 miles, and the road offers no obstacles. The object of their journey was not to make a minute or detailed survey, but to determine if it were practicable to carry a telegraph over the island.

The second Paper read was—

2. *Further Details relative to the Discoveries in Central Australia.*

By Mr. J. MACDOUALL STUART.

Communicated by Sir R. I. MURCHISON.

THE expedition of Mr. Stuart, to which the present journals refer, took place in the year 1859, and was introductory to the great journey which he made through the middle of Australia. Mr. Stuart's object was a thorough examination of the country including and adjacent to that remarkable district of springs which lies between the 28th and 29th parallels of s. latitude and the 136th and 137th w. meridians. Many of these were first discovered in the present expedition, and the entire list includes the springs of Hope, Strangways, Fanny, Freeling, and Primrose.

The waters from nearly all of them run in the rainy season into the Neales, which supplies a large saline lake that extends between the above-mentioned parallels and apparently still further to the north. It represents a middle section of that large horse-shoe representation of water which appears in early maps of Australia under the name of Lake Torrens, but which recent discoveries have shown to be discontinuous. The opposite side of the lake was in no case seen by Mr. Stuart; however, the low shores afforded him no point of view of a greater altitude than 30 feet.

On the road between the Strangways and the Hope, Mr. Stuart found a remarkable specimen of that peculiar type of springs which characterize much of this part of Australia. Observing a hill at

the head of a salt lagoon, upwards of 100 feet in height, and having the appearance of rushes growing on the summit, he climbed to the top, and found such was really the case, and that the reeds and rushes were due to a collection of water upwards of 100 feet in length, that trickled over and oozed through the sides of its basin and finally drained into the lake below.

SIR RODERICK MURCHISON said, as this Paper had been sent to him by Messrs. Chambers and Fincke, he felt it necessary to lay before the Society a general view of the relations this Paper bore to Mr. Stuart's discoveries. In the first instance that traveller explored the very region which had just been described; and on a subsequent occasion he made that remarkable journey almost across the continent which had been recently made known. But they were quite ignorant of the fact, that between these two explorations, he had diverged from his route to the east, and, to his surprise, he found the rivers which ran to the east, falling into a low saline country, and ultimately into an intensely salt lake. About sixty or seventy miles farther northward he still found this great salt lake, and mounting the highest hill in the neighbourhood, could not see the end of this saline depression.

On a former occasion he (Sir R. M.) and Count Strzelecki apologised for having endeavoured to speculate too much upon the supposition of there being a saline lake in the interior, Mr. Stuart having found oasis after oasis of good land, and having discovered, as Colonel Gawler had suggested, that there was a vast region of country capable of colonization. But admitting all this, he (Sir R. M.) was still prepared, from the evidence of the last paper, to suggest the probability of the existence of a central saline desert. There was room enough for this low arid depression between the fertile regions claimed by Colonel Gawler to the westward, and the countries to the east, which were known to be fit for occupation. At present, however, they were only theorists, and must be theorists until the country was more opened up. Yet he maintained that the theory of an interior saline tract had something to rest upon, for Sturt, Stuart, and Gregory, the first on the east, the second on the west, and the third on the north, had been stopped by saline interior tracts. These facts showed that Colonel Strzelecki and himself were not altogether wrong as to the physical geography of this region. In conclusion Sir Roderick pointed out the value of Mr. Stuart's researches, and expressed his hope that the Society would, at a very early day, confer upon that remarkable man one of its highest honours, and at the same time return their cordial thanks to Messrs. Chambers and Fincke for the munificent manner in which they had acted.

MR. J. BAKER, a member of the Legislative Council of South Australia, said he believed that the theory of Sir Roderick Murchison would prove to be correct. Having a thorough knowledge of the country, he had no doubt, from the direction of the water-courses, that there was a considerable depression and probably a large lake in the interior. He went into the neighbourhood whence Mr. Stuart started on his first expedition, and he performed a long journey with Mr. Fincke, in the expectation of finding a lake in that direction. The natives, in describing the country, indicated the existence of a depression into which the drainage from the east and west flowed. They also gave them to understand that large fish were to be found there, and that there were numerous springs frequented by wild fowl, including the black swan. A subsequent visit realised the descriptions given by the natives as to the springs and wild fowl, and he had no doubt that their other indications with respect to a depression in the interior would prove to be correct. In 1858 the Deputy-Surveyor-General, in an excursion to that country, discovered what he supposed to be

a lake, but upon making a subsequent exploration he was surprised to find no lake there at all, but merely a water-washed plain, the waters of which had subsided in a very short space of time. Now where could that water have gone if there were not some larger reservoir to receive it? There was not time for evaporation or absorption, and in his opinion it must have gone into this larger reservoir still farther to the north.

But, while believing in the truth of Sir Roderick Murchison's theory, he at the same time hoped that the expectations of Colonel Gawler would be fulfilled, and that the good country which Mr. Stuart had traversed would become available for colonization, and for supplying with stock the settlement which would one day, no doubt, be formed on the Victoria River. It had already been proposed to organise a party for the purpose of sending a small quantity of stock from South Australia to the North, with the view to form the nucleus of some future settlement on that river.

Mr. Baker next dwelt upon the supplies of wool and produce which the region in question would probably be the means of contributing to the English markets, and to the great outlet which it would afford for drawing off the surplus population of this country, and thus diminish the mass of poverty which struck an Australian with surprise upon visiting London for the first time.

In conclusion Mr. Baker said he felt it was but an act of justice to vindicate Mr. Fincke from some imputation cast upon his honour and integrity in a despatch which had been sent over to this country and read before the Geographical Society.

SIR RODERICK MURCHISON assured Mr. Baker that no such despatch had been received, and that the name of Mr. Fincke, which had only recently been made known to the Society, was duly honoured by them.

COLONEL GAWLER said he was perfectly gratified if but one part of his theory should remain, viz., that there should be an open road for stock, railways, a telegraph, and so on, from the south-eastern provinces to the north-western coast. Mr. Stuart had established that this did exist, and that the settlers who followed his footsteps might travel with ease and security, and establish themselves in the country with much facility. It was known that there was also much good land to the eastward, and it only remained for this country to take advantage of these discoveries. It was also desirable that a colony should be formed on the north-western coast, and on the Victoria River, for the sake of receiving the stock and merchandise which would come up to it from the south-east colonies. No time should be lost, because squatters and bushmen would be settling on the land; and (as he had heard from Mr. Baker) a party had already set out with stock to traverse the route Mr. Stuart had opened up, in the endeavour to find shipment on the Victoria River for the south of India. If this region were settled he had no doubt a railway and telegraphic communication would soon be carried across the Continent, the latter to be continued to Singapore, and thence to England. Colonel Gawler proceeded to remark upon the results of Mr. Stuart's discovery, and argued that, from the evidences of its being an auriferous district, it ought to be brought under law as speedily as possible.

The PRESIDENT, in closing the discussion, remarked upon what he termed the dramatic manner in which the structure of Australia was little by little revealed to us. Sometimes one theory was up, sometimes another, and we had seen the life and death of theories within the last few weeks. He had no doubt the expeditions which had just been sent out would clear up all these uncertainties and show us what Australia was really made of.

Seventh Meeting, Monday, February 25th, 1861.

SIR RODERICK I. MURCHISON, VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*Captain Chas. Duncan Cameron ; Edmund Gabriel ; Nathaniel Gould ; Wm. Bosville James ; and Julius Reuter, Esqrs., were presented upon their election.*

ELECTIONS.—*Captain H. B. Carter ; Lord Colville ; Commander C. Golding Constable, I.N. ; Dr. Thomson, Provost of Queen's College, Oxford ; and W. Blackney ; C. C. Bowen ; W. C. Knight Clowes ; R. Kerr Dick, B.C.S. ; A. Gilliat ; H. Hardinge, M.D. ; T. Hawksley, C.E. ; A. Steinmetz Kennard ; L. Mackinnon ; W. Napier ; A. Adams Reilly ; E. Wynn Roberts ; E. Schenley ; J. Sidney Smith ; A. J. R. Stewart ; and E. Webster, Esqrs., were elected Fellows.*

ACCESSIONS.—Among the accessions to the Library and Map Rooms since the former meeting were—Mackay's Manual of Modern Geography ; Transactions of the Royal Society of Tasmania ; Landsberg's Map of Queensland, Australia ; Continuation of Ordnance Survey Maps, &c. &c.

Before reading the Paper of the evening—

The CHAIRMAN said, as he had invariably taken the deepest interest in the exploration of the interior of Africa, and had often, as former President of the Society, to speak in commendation of the various distinguished travellers who have from time to time made us acquainted with large regions unknown to our ancestors, so it was well known to the Society, as well as to himself, that the African subject which has most recently absorbed our attention is the expedition under Captain Speke, who is now on his journey from Zanzibar to that Lake Nyanza Victoria which he discovered when associated with Captain Burton, and from the northern end of which he hopes to trace the source of the Nile. But when the gallant captain brought before us his project, he was most imperfectly acquainted with the very great difficulties he would have to encounter even if he reached the northern extremity of the Lake Nyanza, in having to cross a broad, wild region, inhabited by savage tribes of negroes, who dwell above the highest cataracts of the Nile. To aid him in this effort, there was, however, happily for him and for the progress of geographical science, a gentleman on leave of absence in this country, who, having been our Vice-Consul in Soudan and many years a resident in that region, had made explorations up the western branches of the White Nile, and who had gone northwards to Gondokoro towards the lake discovered by Speke. Consul Petherick was that individual, and he (the Chairman) was persuaded he was the only European who, from his great experience and his influence over the natives, could afford real assistance to Captains Speke and Grant in their endeavour to solve the great problem of all time as to the real sources of the Nile. When he presided over the meeting of the geographers and ethnologists at the last meeting of the British Association at Oxford, he invited all his friends to unite in subscribing such a sum of money as would enable Mr. Petherick to purchase grain enough to succour the party of Speke and Grant when they arrived from the south, Petherick himself engaging to proceed beyond Gondokoro to meet the explorers. To the honour of the Royal Geographical Society, it has realized through private subscription upwards of 1000*l*.

for this noble object; and as Consul Petherick is about to proceed immediately to his post at Khartum, and thence to carry out their behests, the Chairman was sure the Society would rejoice to wish him every success, whilst they were all quite certain that in the heart of Africa, and in overcoming all difficulties, Consul Petherick is truly "the right man in the right place." And as Mrs. Petherick is to accompany him, he felt confident that, with the same spirit of geographical research which animates the ladies who have honoured us with their presence, she would warmly second and support the resolve of her daring and distinguished husband.

MR. CONSUL PETHERICK said the President had so well described the difficulties that lay in the way of Captain Speke's progress from Lake Nyanza to the Nile that it was unnecessary for him to add more. It was only reserved for him to assure the Geographical Society that he would do the utmost in his power to carry out their object of effecting a meeting with Captain Speke. Naturally, any Englishman situated as he would be in those regions, hearing of the coming of a countryman, would do his utmost to see him; therefore he took no merit to himself for promising to do that. The circulars of the Royal Geographical Society in connection with his expedition pointed out that there was a wish that he should proceed towards the sources of the Nile, provided Captain Speke did not succeed in discovering them. For carrying out such an expedition as that the sum of 2000*l.* would be required, as has been stated in the circular. However, little more than half of that sum had been subscribed, which would only suffice for carrying out the first part of the project of the Society, namely, that of meeting Captain Speke and supplying him with grain and other necessities. In case he did not meet with the Captain at Gondokoro, he purposed proceeding into the interior in order to bring about the meeting.

SIR RODERICK MURCHISON then called upon M. Du Chaillu to read the remarkable communication which he was about to make to the meeting. He had had the pleasure of M. Du Chaillu's acquaintance since he arrived in this country, and he had been impressed with the deepest respect for his acquirements and his unbounded activity. As a traveller, M. Du Chaillu had realized for them a knowledge of a large portion of the equatorial Western region of Africa, of which they were previously entirely ignorant.

The Paper read was—

The Geographical Features and Natural History of a hitherto unexplored region of Western Africa.

By PAUL B. DU CHAILLU, of New York.

The singular region of Africa explored by M. Du Chaillu during the four years, 1856, 7, 8, and 9, lies within 2° on either side of the equator, and extends from the western coast to an estimated distance of 400 miles into the interior. It is characterised by mountains covered with forests of tropical richness, and traversed by many rivers. Instead of the thinly wooded and sparsely watered plains of many parts of Africa, or marshy plateaux such as are found elsewhere, the explorer is involved in a jungle of extreme density, through which he cannot penetrate except by following the tracks of wild beasts, or the miserable paths kept open by the natives from one village to another, or else by hewing his way. Wild animals are so scarce, though of numerous and novel species, that the traveller is unable to supply himself with sufficient game for sub-

sistence, but has to depend on the food he carries with him. The lion, rhinoceros, giraffe, zebra, and ostrich are all absent, but there are elephants and a few noble antelopes, and huge man-like apes, including the gorilla. The domestic animals of the comparatively few natives who inhabit this country, so desolate of life though rich in vegetation, are goats, sheep, fowls, and a small species of dog. The horse, ox, and ass are unknown; man, or rather woman, is the only animal of burden.

In the country under consideration, there are three rivers north of the Equator which can be entered and ascended by large vessels, viz. the Muni, the Moondah, and the Gaboon. The two first of these debouch into the beautiful bay of Corisco, which, were it not for its sandbanks, would be one of the finest roadsteads in the world, while the estuary at the mouth of the Gaboon is one of the best harbours in Western Africa. All these rivers, and other small ones, rise about 80 miles from the coast, in the so-called Sierra del Crystal: near their mouths they traverse vast mangrove-swamps, where their banks are little occupied; the Moondah is especially malarious. South of the equator M. du Chaillu found that three rivers, the Nazareth, Mexias, Fernando Vaz, all communicated with one another, and that, although the Fernando Vaz has a source of its own, it as well the others are the outlets of a great interior river, the Ogobai. They form a very complicated network of creeks and swamps, covered with dense forests, flooded in the rainy season, and uninhabited save by wild beasts, reptiles, and intolerable swarms of musquitoes. These rivers throw an immense amount of water into the sea, and in this they differ much from the sluggish Muni, Moondah, and Gaboon. Though their mouths are hardly half a mile across, they severally launch out so much water during the rains that it keeps separate from the ocean for four or five miles. The entrance to all of these rivers is intricate, owing to shifting sandbanks; that of the Fernando Vaz is the least so. M. Du Chaillu looks upon the Ogobai as a very important river. He ascended its trunk stream for only a short distance, but he afterwards came upon the southern and the smaller of its two tributaries at a great distance from the coast, and found it a splendid river from 300 to 400 yards wide, running at 3 or 4 miles an hour, and 4 fathoms deep in different places where he sounded it. This was during the rainy season.

As far as M. Du Chaillu penetrated, and for a distance of 20 days further on which he obtained information, there lay a mountainous country running east and west, which he believes to be part of a vast chain extending to a much greater distance inland, and possibly crossing the entire continent. He thinks that from this range may arise affluents to the Niger on the one side and to the

Ogobai and the Congo on the other, and also that it may afford a natural limit to the advance of Mohammedan conquest.

M. Du Chaillu described the various nations among whom he travelled, including the cannibal tribes of the Fan and the Osheba. He also gave accounts of his conflicts with the gorilla, illustrating his remarks by numerous stuffed specimens that were exhibited in the room. He described its habits and those of the arboreal-building ape, the *nshiego mbouvé*, and dwelt at length on the fauna of the land, the study of which was the main object of M. Du Chaillu's journey.

SIR RODERICK MURCHISON remarked that geography, in the broad sense of the word, included all natural history, and especially ethnology; therefore neither of his friends—Professor Owen, and Mr. Craufurd, the President of the Ethnological Society—would quarrel with the geographers for having that night given so much attention to these topics. The communication just read had not been confined simply to the courses of the rivers and the nature of the mountains, as illustrated in M. Du Chaillu's sketch-map. He therefore felt they were bound to return M. Du Chaillu their grateful thanks for the varied information contained in his papers, and to prove that they were proud of an occasion which had shown to the world that their Society could, from time to time, embrace all those collateral subjects of which geography was the foundation. M. Du Chaillu, who was the first European who had ever penetrated into the interior of Equatorial Africa from the west coast, had thus made us acquainted with the existence of a large range of lofty and densely-wooded mountains, to some extent inhabited by cannibal races, and also the chief abode of the gigantic ape gorilla. He has also told us that the Mahomedan conquerors, proceeding from the north, had never passed that chain, and that to the south of it no other religion than Fetichism was found to exist. The inhabitants had never seen a Mahomedan, and were entirely ignorant of that religion. It was now his duty to call upon any gentleman to speak upon the very remarkable memoir, the result of such perilous and adventurous journeys, which had been communicated to them.

MR. GALTON said this exploration of M. Du Chaillu, most interesting in itself, had a farther interest in regard to our notions of the physical geography of still more distant parts of Africa. If we looked in any of our ordinary maps, we saw that the drainage of the central part of Africa, where equatorial rains fell with extreme violence, was wholly unrepresented by any rivers except the Congo, and even that river was not usually represented as receiving tributaries from the north. In those latitudes where M. Du Chaillu travelled, rain fell for nine months in the year. There was also a spreading out of the coast, suggestive of the delta of some large river which had displaced the sea by its deposit, yet no large river had hitherto been ascertained, on European testimony, to exist in this place. Far more towards the interior, in these equatorial latitudes, reports are heard of rivers flowing to the west, which may be tributaries of the Congo, but which it is at least an equal matter of probability are the head-waters of the northern branch of Du Chaillu's rivers. There is, for instance, that account given in vol. xxiii. of the Society's 'Journal' of an itinerary which Dr. Barth obtained from a well-informed Fellatah, who accompanied a marauding expedition from Darfur southwards, across the mountains, and whose progress was ultimately stopped by a magnificent river running west, from which the terrified natives had removed their boats. Then again there is Mr. Petherick's river; and lastly, the river with an east and west course, either running in or running out of Lake Nyanza.

Mr. Galton stated that, so far as testimony went, it was now a matter of complete uncertainty whether this river fed or drained the lake. He wished to show that this was a zone characterized by great rivers, of whose existence we are beginning to be aware and of whose course we know nothing, but on which the discovery of one great outlet, like that described to-night, makes it difficult to refrain from speculating. He added that, so far as we yet know, there is no valid reason why Du Chaillu's river should not have its origin on the other side of the continent, nor why the waters of Lake Nyanza (as he wrote some months back to Captain Speke)—should not have their outlet by it or by the Congo instead of by the Nile. He merely mentioned this to show how many elementary problems in African geography are waiting to be solved, and he hoped that the further exploration of this river, of which M. Du Chaillu had brought us the first certain information, would become a recognized object of the Geographical Society.

PROFESSOR OWEN said natural history had rarely received a more remarkable or acceptable acquisition to its stores than had been imparted that evening by the adventurous traveller M. Du Chaillu. Hitherto it had only obtained a few material evidences—dead skins or dry bones—of this great gorilla; but now for the first time the naturalist had heard from one who had seen the gorilla in its native country some authentic account of its living powers and habits. Seven years ago he (Prof. Owen) had obtained the first reliable indication of the existence of such a creature from a missionary at the Gaboon, who sent him a pen-and-ink sketch of the skull of one of these great apes, which he had seen stuck upon a pole and worshipped as a fetish by some tribe in the interior. By degrees there came parts of the skeleton, then the badly-conserved skins of young or immature animals, finally the entire skeleton of the full-grown male, which had enabled him to make a thorough comparison of the bony framework of the huge quadrumanous beast with that of man. But now M. Du Chaillu had brought a plenitude of evidence, skins and skeletons of adult males, females and young of all ages, showing for the first time, indubitably, the characteristic colours, and affording the richest illustrations of this most strange and extraordinary animal of the brute creation. In natural history, as we went on comparing form with form, of course we soon became impressed with the idea of a connected scale, and the interest increased as we ascended; but when we came so near to ourselves as we did in the comparison of this tailless anthropoid ape the interest became truly exciting.

The learned Professor then called attention to a diagram showing the skeleton structure of the gorilla as compared with that of man; and he pointed out how much closer the approximations were in this creature to the human frame than in the chimpanzee and the orang. The most extraordinary feature in the structure of the gorilla, he added, was the prodigious strength of the trunk, which in its proportions exceeded that of the Irish giant, 8 feet 2 inches in height; and the only reason why it did not overtop man was that the lower limbs were dwarfed, in order that they should do the work of great grasping arms rather than of legs. There was a difference, however, in the number of lumbar vertebræ: in man there were five, and in the gorilla two. In man, again, there were twelve pairs of ribs, in the gorilla thirteen: an additional pair being given to support the muscles that were to act upon and from the trunk; but he explained the artificial nature of these vertebral differences. The brain-case was not so large as that of the human infant, while, as contradistinguished from man—in whom the great brain not only covered the little brain but went behind and beyond it—there was in the gorilla no trace of this posterior lobe beyond the cerebellum. Limited as the gorilla was to localities, with special conditions for abundance of tropical vegetable food, he supposed in progress of time it would become extinct.

Professor Owen next adverted to the progress made in the study of natural history during the last twenty or thirty years, and to the numerous accessions

which had been made in this particular branch; and concluded by expressing the hope that Government would provide a suitably-sized building for the classification and exhibition of objects in comparative zoology.

SIR RODERICK MURCHISON said there were several distinguished travellers from Africa in the room, but the hour had arrived at which they generally closed their discussions; and, after the admirable discourse of Professor Owen and the remarks of Mr. Galton, they could not be otherwise than gratified at the result. They were honoured on that occasion by the presence of his Royal Highness the Count De Paris, and also by that of one of the most distinguished men in her Majesty's Government. If Mr. Gladstone would address them in a few words, he (Sir Roderick) was sure they would willingly listen to him; for they were all proud to see a man of such eminence and distinction giving his marked attention to the subject before them.

THE RIGHT HON. W. E. GLADSTONE, M.P., said, that being called upon to address this assembly on such an occasion he felt like the lowest schoolboy in the school being called upon to lecture his instructor. He wished it were in his power more frequently to appear in these rooms in the character of a pupil. But really, although on previous occasions he had once or twice enjoyed the privilege of attending these meetings, yet he could not believe that even that Society would be able frequently to receive such a treat as they had had that night. For it could be no presumption even for him to say, that we had heard to night one of the most modest, one of the most talented, and one of the most enterprising of modern travellers. And that the rich and rare discoveries which he communicated, we had heard illustrated, developed, and applied to many of the highest and most important points of knowledge, by a man who is gifted with perhaps the most brilliant genius among those who in this or any other period have applied themselves to the study of natural history. He was sorry that his eminent friend Sir Roderick Murchison's old friendship induced him to call upon him (Mr. Gladstone) to address the meeting even in these few words, yet he at least felt that regret was qualified by satisfaction in having that opportunity of expressing his gratitude to both those gentlemen for the extraordinary boon they had respectively conferred.

The Meeting was then adjourned to March 11th.

Eighth Meeting, March 11th, 1861.

SIR RODERICK MURCHISON, VICE-PRESIDENT, in the Chair.

PRESENTATION.—*Sir Charles Bright.*

ELECTIONS.—*Commanders P. H. Dyke and H. E. Gunnell, R.N.; Major W. Ross King; Dr. W. Lauder Lindsay, M.D.; Rev. E. J. Moon; the Hon. Roden Noel; Sir Henry Stacey, M.P.; Major Alexander Strange; Rev. W. H. Walker; John Anderson; Robert Armstrong, late Chief Magistrate of Sierra Leone; Henry Baillie; William Brodie; Peter Morrison; Samuel Ingall; T. G. Knox; George Lorimer; W. Robert McConnell; Pliny Miles; and John Edward Woods, Esquires, were elected Fellows.*

ACCESSIONS.—Among the Accessions to the LIBRARY and MAP ROOMS since the former Meeting were *Der Stille Ocean und die Spanischen Besitzungen im Ostindischen Archipel*, by Baron Ch.

Hügel; Vol. XI. of Reports of Explorations and Surveys for Railroad from the Mississippi River to the Pacific Ocean; Map of the Rio Colorado of the West; Beriah Botfield's Shropshire; Lawson's British and Native Cochín; Continuation of the Ordnance Map of Lanarkshire, &c. &c.

EXHIBITIONS.—Numerous Japanese Works, Maps, and Atlases, including Japanese Dictionary, Books of Buddhist Charm, Themes and Odes, Geography, Description of European Instruments and Machinery, Hobson's Natural Philosophy, Comparative Anatomy, Surgery, &c., were exhibited by Mr. A. Wylie, the Missionary; also several Coins by Mr. Hodgson.

ANNOUNCEMENTS.—The Chairman announced that, in order to illustrate the Memoir of M. Du Chaillu on Equatorial Africa, recently read before the Society, the large room in the house of the Society would be used, for a few weeks after Easter, to exhibit his specimens, with maps and drawings. The Fellows, on application, would have tickets placed at their disposal; and a certain number would also be sent to the councils of various scientific bodies in London. Also that the Council had granted to the Royal Institution the loan of maps and drawings illustrative of the region of M. Du Chaillu's explorations for his intended lecture on Monday, the 18th inst.

The Papers read were—

1. *Account of Four Excursions in the Japanese island of Yesso.* By PEMBERTON HODGSON, H.M.'s Consul at Hakodadi.

MR. HODGSON describes four journeys which he made from Hakodadi. They were of from four to six days' duration: two of them were into the interior, and two along the coast. He rode unarmed with a party of ladies, attended by thirty or forty servants, and did not experience the slightest obstruction. He found the island to be uninhabited and almost unknown to the Japanese in the interior, though supporting a large population of fishermen along its coast. The aborigines, who are unkempt and demi-savage, and are despised by the Japanese, number about 80,000. Large quantities of fish and edible seaweed are collected on the coast and exported to China. In one part Mr. Hodgson mentions villages every few hundred yards, where the natives mow the abundant seaweed off the rocks. They live on this, on fish, and on rice. Five miles from the line of coast there remains hardly any sign of habitation. The interior of the island is mountainous on a small scale, and beautifully wooded. Its vegetation is exceedingly various and ornate, including chestnut, oak, beech, pine, silver-birch, sycamore, magnolia, and catalpa among

the larger trees, together with an undergrowth of remarkable richness. Two active volcanoes were ascended by the party; a medico-botanical garden was visited, where students were busily engaged; also a lead-mine and some iron-works: a few indications of gold were found. The botanical collections that were made have been sent to Kew. Mr. Hodgson speaks admiringly of the perfect courtesy and hospitality he experienced throughout his short journeys.

THE CHAIRMAN returned his hearty thanks to the gentlemen who had forwarded to the Society the interesting document which had just been read. He might truly say that this communication was one of the many proofs of the usefulness of the Royal Geographical Society; for Mr. Hodgson's paper might have been tied up in red tape and never have been known if the Geographical Society had not existed. It was to the public interest that such papers should come from the Secretary of State, being of real use to the country in pointing out new channels of commerce, and he considered that the Society in discussing and publishing them became an important auxiliary to the State. On that occasion they had not many gentlemen present who had visited Japan. He regretted that they had not with them Captain Osborn, but fortunately they had present the gentleman who was recently appointed her Majesty's Secretary of Legation, and who would have to proceed immediately to Japan, that well-known traveller whose works were descriptive of the geographical and physical features and the political condition of many parts of the world as well as of China and Japan. He alluded to Mr. Oliphant, and, as he was about to proceed to those regions, he (the chairman) wished to impress upon him that when he sent his dispatches to Lord John Russell this Society would receive any portion of them with delight.

MR. OLIPHANT thanking the meeting for the kind manner in which they had received his name, expressed his determination to send home to the Geographical Society, through her Majesty's Government, any information which he might collect; and said he hoped he should be able to push his explorations far into Japan. They might not be aware that by the conditions of the treaty, the right of travelling into the interior was confined to the members of the mission at Jeddo, so that he and his colleagues would have a monopoly of explorations into this most interesting country. When he was there before, the limited opportunities which he had for observation were confined entirely to Nagasaki and Jeddo; therefore, he knew very little of the island upon which the paper treated. He was sure, however, that that island was extremely important in a geographical point of view. It was a remarkable circumstance that the Japanese themselves hardly seemed to have known of its existence so recently as the beginning of the seventeenth century, for in the treaty negotiated between King James I. and the Emperor of Japan in 1613, the last clause stipulated that the English should have the right to go and *discover* the island of Yesso. It showed at any rate that in those days the Japanese were not afraid of us, and that the island of Yesso was a *terra incognita*. They trusted us then, and he hoped they would trust us still, and allow us to develop the natural resources of that island without interference. He should be glad to hear from Mr. Hodgson what the articles of trade were which Yesso produced for foreign merchants. It was to Yesso that we to a great extent owed our treaty, because the Americans who first opened Japan did so from the necessity which had arisen to induce the Japanese Government to relax their laws with reference to the crews of ships which might be wrecked upon their coasts. In the summer of 1850, there were no less than 800 American whalers in the seas in the immediate neighbourhood of the island of Yesso,

and wrecks were constantly taking place. It, therefore, became very important for the American Government to make arrangements with the Japanese Government that the crews of wrecked ships should be protected; and the treaty which the Americans made had been followed by our treaty. He thought it was a reflection upon us that we should know so little of that coast, and should only have one surveying ship out there. The fact mentioned by Mr. Hodgson, that he went through the country totally unarmed, was worthy of notice, because the later accounts we had received of Japan rather contradicted the impression which he (Mr. Oliphant) had conveyed in his book, and which he certainly obtained while he was there, of the favourable disposition of the Japanese towards Europeans and the kindheartedness of the people themselves. He believed he should have no reason to change his opinion when he went there again. It was very natural that in a country where the whole government was conducted on a system of exclusiveness, prejudices should exist, especially on the part of what we in this country should call the extreme Conservative section of the aristocracy, against Europeans. Those who had the task of governing the country felt the difficulties which might be incurred by admitting a new element altogether into the condition of affairs. Their politico-economical system had been regulated upon the hypothesis that Japan was excluded from the rest of the world. Sumptuary laws existed, defining exactly what each class should wear, and very often what they should eat. Supply and demand were regulated accordingly: it was quite manifest, therefore, where a new and an uncertain element was introduced, such as the fluctuations of foreign commerce, tending to produce a disturbance of this supply and demand, which at present were exactly proportioned the one to the other—that the ruling classes should become very anxious as to the result and show some reluctance to the carrying out of the treaty. He was quite sure it rested with the English merchants there, so far to conciliate this feeling on the part of the ruling classes as to render the task of conducting our relations with that country every day more easy.

SIR FREDERICK NICHOLSON said that, having visited Hakodadi, he wished to make a few remarks on the paper which had just been read. With reference to the survey of Hakodadi harbour, made by the officers of the United States navy, he must bear his testimony to its great accuracy. He could confirm Mr. Hodgson's statement as to the friendliness both of the people and of the official authorities at that port. They were far less exclusive than those at the southern ports of Japan; and they evinced on all occasions the greatest desire to obtain information respecting European arts, sciences, and customs. Although no opportunity had presented itself to travel as far into the country as Mr. Hodgson had done, he (Sir Frederick) agreed with that gentleman in comparing parts of the country to Switzerland, and he instanced a beautiful valley in the immediate neighbourhood of Hakodadi, where the houses greatly resembled Swiss chalets in their construction. He also alluded to the extreme discipline to which the Japanese people are subjected. With respect to the importance of Hakodadi as a harbour, he considered that the abundance of vegetables, especially of potatoes, which are an excellent antiscorbutic, would render it a valuable place of resort to whalers and other vessels navigating those seas; and, taking into consideration the number of convenient and well-sheltered harbours recently acquired by Russia on the adjoining coast of Chinese Tartary, he was of opinion that Hakodadi might in future times be most useful to us, especially if our trade with Japan were to increase, as there is every prospect of its doing.

MR. PEMBERTON HODGSON considered that Hakodadi was one of the largest ports in Japan. From the opening of the port, June, 1859, to his leaving it in October, 1860, he thought that no fewer than 117 ships had entered it, and amongst them were 57 whalers. The exports consisted chiefly of fish for the Chinese. As to the mineral productions of the country, there was sulphur and

a small quantity of lead. There was also a good deal of tea from the neighbouring isle of Nippon brought there. While he was at Hakodadi several men-of-war visited the place from Russia, though during last year, since the opening of the ice in June, there had been only three Russian vessels of that kind. He had no doubt that some day or other Hakodadi would be a place of great importance. As to the Government of Hakodadi, he had himself found no difficulty. He did not wish to throw unnecessary blame upon his own countrymen, but a great deal of the difficulty which they experienced had to be laid on their own shoulders.

The CHAIRMAN said that there were several Japanese productions which had been sent to the Society by the Rev. Mr. Wylie, who had been a missionary in Japan. If Mr. Wylie was present, he was sure they would be glad to hear any thing from him in reference to that remarkable island.

MR. A. WYLIE said he had no information to communicate to them in reference to the island which had been mentioned that night, as he had never been there; but as he supposed that anything regarding Japan might be interesting, he would mention some things which he had seen and heard in reference to it. While he was there, it was his desire to inquire and gain as much information as he could in regard to the habits of the people, and he mixed with them as much as possible. His impression with regard to the people must, of course, be accepted as merely the result of a short stay in one part of the empire. Comparing the Japanese with the Chinese, his opinion was that they were inferior as a race in a physical point of view, and he believed them to be also mentally inferior to the Chinese. He might be wrong, but he stated what was his impression from a short observation. He believed also that there was much in the Japanese character to which they, as Europeans and Christians, would be averse. He had found much *finesse* among them: in fact, he might say that they were accomplished in the art of deception. Having said so much about the black side of Japan, he thought also that there was a great deal in their favour. They were a very energetic people, and they were very desirous of improving their position; they took every means in their power of advancing their intellectual skill and raising themselves in the scale of civilization. He thought it was important, now that the country had been opened to us, that we should know something about the Japanese character. He was happy to hear from Mr. Oliphant that he proposed to treat with them in a conciliatory manner; for their system of civilization was very different from our own, and if we did not make allowance for their ideas and habits we should inevitably get into trouble. As to the desire of the people to improve themselves, there were in the country very many who were well acquainted with the Dutch language: they had on the table abundant proof of that in the books which they had written. The Dutch were the only people who had been admitted to them for two hundred years; but now the country was about to be opened to Russia, England, and France, and it was found that the people were equally anxious to obtain a knowledge of the languages of those countries. He found that many even of the children were already acquiring a tolerable knowledge of English, and were able to speak English; but it appeared that though they desired to have that knowledge for the sake of commerce, they had also another object in view,—they had an earnest desire to read books published in Europe. Of this we had an evidence in the fact that the Japanese had transferred many of these into their own language unaided. The English were very badly off for works to aid them in acquiring the language of Japan. A vocabulary was published by Dr. Medhurst more than thirty years ago, and the Japanese had got that book and reprinted it entire. It was almost the only work the English had for teaching the Japanese language, and the Japanese used it in their turn for learning the English language. More recently a number of works had been published in China for the purpose of imparting a knowledge of European

science in that country, and many of them had gone to Japan. He might refer to the recent publications of Dr. Hobson in Chinese, which had been largely distributed in Japan. Those surgical and medical works had been reprinted by the Japanese. At present there were several Dutch, imparting to the Japanese a knowledge of the arts and sciences. In Nagasaki the emperor had a large factory, under the superintendence of Mr. Hardes, for the manufacture and repair of steam engines, with an apparatus equal to that of a first-class machine-shop in this country. They had a Dutch officer for two years instructing them in military tactics; and Dr. Pompe van Meerdervoort, a medical man, had been applying himself for a considerable time past to a dissemination of medical knowledge amongst them. The latter gentleman had recently received from the Japanese Government several bodies of culprits for the purpose of teaching anatomy to the native students. These bodies were dissected by the Japanese, under his superintendence, and he said they were making great progress in the study of the science. From the reports of that gentleman and others, he (Mr. Wylie) had been induced to conclude that such an operation had never taken place before; but he was somewhat surprised and interested to find in a native work, a detailed account of a dissection, performed at the capital in 1822, exclusively by Japanese operators, who had obtained their knowledge by means of the study of European anatomical publications. He was led to believe, while in the country, that there were great resources for commerce in Japan which were yet undeveloped. The trade in tea was increasing; and he imagined that after a time, when Europeans became more accustomed to the tea of Japan, it would be considerable. With regard to mineral productions, he believed there was an immense store in Japan of which we had very little knowledge. He was very anxious to ascertain as much as he could as to the religious position of Japan, and he prosecuted his inquiries as far as practicable; in doing so he had the assistance of a gentleman who had lived for some time in the country, and consequently had a knowledge of the inhabitants, their customs, and their views. He found that although the ritual of Confucius was generally adopted in Japan, yet they were not so devoted to it as the Chinese were. Buddhism was much more prevalent, but it differed considerably from that of China; its secular development seeming to have been arrested in Japan at an earlier period of its history. Idolatry was not carried to such an extent; and image-worship was more restricted than in China. There were six different schools of Buddhism in Japan, one of which was of a very singular character: the priests were allowed to eat flesh-meat and to marry, innovations utterly opposed to the spirit of Buddhism in any other country. But besides these there was the Sintoo religion, which might be termed par excellence the national creed; the emperor being the high priest. The origin of this system was lost in the mazes of prehistorical antiquity, and offered a renumerate field for the researches of the philosophic archæologist. In its initial period probably much analogy would be found with the early religion of the Chinese, which formed the basis where on had been raised the present conglomerate of absurdities under the name of T'auism. Although they had literally "gods many, and lords many," even amounting to several thousands, yet as far as his observations went, these were chiefly ideal, and the spirit of the system was repugnant to material representations of the deity. It was well known that Christianity had been unconditionally prohibited in the empire for two centuries past; and even at the present day, the jealousy of the Government forbade the discussion of the question by its subjects. There had probably been too much cause for the exclusive policy adopted in former days; but we might hope that in due time the views of the powers that be would be so far modified as to tolerate the practice and profession of the Christian religion in a purer form. For this end much would depend on the character and conduct of our countrymen who profess to follow that faith. There were at present a few American

missionaries there, zealous self-denying men, who were preparing themselves by a knowledge of the language and the people, for any future opening for more direct effort which might occur. They lived among the people, and were closely watched by the Japanese, upon whom a favourable impression would doubtless be effected by observing their simple and blameless style of life. For the first time in history, protestant worship had been established at Nagasaki within the past twelve months, and there was a probability of a church being built at Kanagawa. With the introduction of Christianity into that empire, we might naturally look for the disappearance of much that is at present so repulsive in the national character.

The second Paper read was—

2. *Travels in Siam.* By Sir R. H. SCHOMBURGK, Cor. F.R.G.S.,
H.M.'s Consul at Bangkok.

SIR R. SCHOMBURGK left Bangkok in December, in company with two nephews of the King, who were students at the Baptist Missionaries' school in that place. He passed in barges up the Menam, which he describes as being on the whole a monotonous river. In three weeks' time he reached Rahaing, the most southern of the Lao states, which are presided over by petty princes tributary to Siam. Here the river was left on account of its being too low for further navigation, and the journey was pursued on the backs of elephants—a mode of conveyance of which Sir R. Schomburgk complains bitterly. Lahong, the battlemented capital of another Lao state, was reached in eleven days, after travelling along a mountainous road, "of a description that would have set a timid person into the most nervous state. The pathway up and down the high mountains has no greater breadth than from 5 to 6 feet, with ledges and shelves of rock resembling steps, and frequently a precipice on the right or the left. But the security with which that sagacious animal the elephant travels soon inspires confidence. He draws near to the ledge of the rock he has to descend, sounds its depth with his proboscis, and cautiously puts down one of his fore-feet, and, having acquired footing, the other follows; then the hind-legs are doubled, and he glides upon his haunches to the edge of the ledge, and the first hind-foot, then the next, is put down. If he were not to double up his hind-legs, the angle, when his fore-legs were at the bottom of the ledge, would be of that description that no person could keep on his back. As it is, one has to hold on with all force."

Three days more of a similar road brought the party to Lampoon, and one more, through fertile and highly-cultivated country, to Xiengmai, the largest of all the Laos cities, and about 3 miles in circumference. Sir R. Schomburgk states that there is a yearly export of 400,000*l.* worth of teak-wood from Xiengmai to Moulmein.

It is floated down the river Salween, and may be considered as the only source of supply to the navy-yards in Great Britain of timber of that description. Starting afresh with 150 men and 33 elephants, he passed for three days down the banks of the river Ping, and thence across the great pine-covered mountain-chain which divides Siam from Her Majesty's possessions in Burmah and Tenasserim, and reached Moulmein in twenty-four days.

The CHAIRMAN, after reminding the Fellows of the achievements of Sir R. Schomburgk through a long series of years, and after due praise of his present labours, called upon his friend Mr. Crawford, who knew so much about Siam, to speak on the subject under consideration.

MR. CRAWFORD said they had heard the nature of the country which Sir Robert Schomburgk had visited. That gentleman was twenty-four days upon his journey, and he travelled across the very same sort of country as that through which their friend Captain Sprye desired to carry on the whole of the trade of China. It was a country of extreme difficulty to traverse,—a pathless mountainous forest. His friend the Chairman told him that he ought to say something about the white elephants of the country, and he would do so shortly. The King of Siam had white elephants. He believed he had six when he was there; he saw four, and there were two he did not see. A white elephant was regarded by ourselves as a defective animal; but the Siamese believed in the transmigration of souls, and they believed that a white elephant contained the soul of a king on his way to beatitude. Alluding to the trade of Siam, he said that it had risen to the extent of half a million of exports, and half a million of imports. There was some of the best fruit in the world in the country, and much corn, but with respect to animal food the Siamese were not abundantly supplied.

The Meeting was then adjourned to March 25th.

Ninth Meeting, March 25th, 1861.

SIR RODERICK I. MURCHISON, VICE-PRESIDENT, in the Chair.

ON assembling the Chairman said, "Our gracious Patron the Queen having met with the first real affliction in her life, and the mother of our Sovereign having been interred this day, the Council of our Society has decided that all business be suspended, and that this our ordinary Meeting be adjourned.

"For my own part, let me assure you that the untoward conjunction of the day of our meeting with that of this Royal burial was not brought to my mind until the close of last week, when it was too late to call together a Council and announce publicly that the Meeting would be adjourned. Acting therefore for my friend, our President, Lord Ashburton, who is detained in the country by ill-health, I took upon myself to propose to the Council, this afternoon, that no business should be transacted in the evening, but that, out of courtesy to Members and their friends, who have had no notice of the postponement, I should take the Chair, and make the explana-

tion which was due to them. On this melancholy occasion, when the whole nation is sympathising with their Sovereign, I am sure, Gentlemen, that, as Fellows of the Royal Geographical Society, you unite with the Council and myself in the expression of our devotion to our illustrious Patron, and our heartfelt sorrow for the bereavement she has sustained; and I have now, therefore, simply to announce that this meeting is adjourned to the 8th April."

The Meeting then adjourned to April 8th.

Tenth Meeting, April 8th, 1861.

SIR RODERICK I. MURCHISON, VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*Commander Peché H. Dyke, R.N.; the Rev. C. H. Wallace; Robert Armstrong; and E. W. H. Schenley, Esqrs., were presented upon their Election.*

ELECTIONS.—*Colonel W. Anderson, C.B.; the Earl of Erroll; Lieut.-Colonel G. P. Evelyn; Captain Fitzgerald; the Hon. Dudley Fortescue, M.P.; Captain Francis Green; Dr. James Hector, M.D.; Rev. John Henn; Consul G. S. Lennox Hunt; Colonel James Holland; Captain Richard Llewellyn; Lieut. H. Matthew Miller, R.N.; and J. B. Arundel Acland; John Baker; H. Lewis Bartlett; Higford Burr; Alfred John Elkington; W. Kennedy Erskine; R. W. Kennard, M.P.; Patrick C. Leckie; W. John Legh, M.P.; F. Lehmann; Swallow Leyland; T. Kerr Lynch; W. Morgan, R.N.; T. Page, C.E.; L. M. Rate; W. Reid, C.E.; Graham Moore; Robertson James Theobald, Jun.; and C. Essington Walker, Esqrs., were elected Fellows.*

ACCESSIONS.—Among the accessions to the Library and Map Rooms since the last Meeting were Harper's American edition of Burton's Lake Regions of Central Africa; Petherick's Egypt, Soudan, and Central Africa; Vol. XI. of Smithsonian Contributions to Knowledge; La Confédération Argentine, by Dr. F. M. de Moussy; Plan of J. McDouall's Discovery; Continuation of Ordnance Maps of Ireland; and several atlases, maps, and plans of towns, presented by A. West, Esq., &c. &c.

EXHIBITIONS.—Geological specimens, collected by Mr. F. T. Gregory in North-Western Australia, were exhibited by Professor Tennant, F.R.G.S.: and some specimens of Australian native workmanship by Captain W. Parker Snow.

The Papers read were—

1. *Communication to DR. SHAW from MR. FRANK GREGORY, on the Expedition from Perth to the North-West of Australia.*

MR. FRANK GREGORY, on arriving in West Australia to take command of his expedition, found difficulties in his way. The Imperial Government had granted 2000*l.* towards its expenses conditionally on an equal sum being raised in the colony. However, the Colonial Government were unwilling to take their share, unless certain modifications were made in the plan of the expedition, having reference to their especial exigencies. If Mr. Gregory had waited to refer this altered plan to the approbation of the Imperial Government, the season for travel would be lost long before he could obtain an answer. He therefore advanced the 2000*l.* out of his own funds, and applies to the Government in trust that they would authorize the change of plan and would repay him. He was on the point of starting, and his Excellency the Governor strongly seconds Mr. Gregory's application.

The CHAIRMAN, SIR R. MURCHISON, strongly commended the project of Mr. Frank Gregory, and had every hope that the difficulties alluded to would be overcome.

The second Paper read was—

2. *Memoranda on North-East Australia*, by A. C. GREGORY, F.R.G.S.; with *Report on the Exploring Expedition to the River Burdekin*, by J. W. SMITH, B.N.

Communicated by SIR G. BOWEN, F.R.G.S., Governor of Queensland, through the DUKE of NEWCASTLE, F.R.G.S.

THE despatches from Sir G. Bowen enclose memoranda furnished to him, at his request, by Mr. A. C. Gregory, the Surveyor-General of Queensland, in which he describes in detail the capabilities and present condition of the chief positions in that colony. His Excellency, speaking of Maryborough, says—

“On the banks of the River Mary, as of all the other rivers of central and northern Queensland, there are vast tracts of country admirably adapted for the growth of cotton, of sugar, and of all other tropical and semi-tropical productions.

“Port Curtis is the best harbour, after that of Sydney, on the eastern coast of Australia. It was here that Mr. Gladstone, when Secretary of State for the Colonies, in 1846, founded a new colony, which was abandoned in the following year by Earl Grey on succeeding to office. However, in 1854, the Government of New South Wales again formed on the shores of Port Curtis a township which

has been named Gladstone, and which is the outlet of the adjacent pastoral countries of Pelham and Clinton. The excellence of the harbour, the salubrity of the climate, and the beauty of the surrounding scenery combine to render Gladstone an eligible site for a flourishing city; but the river Fitzroy, farther north, affords a more ready access to the interior of the colony, and consequently the settlement of Rockhampton, on its banks, has advanced more rapidly up to the present time. The town of Rockhampton was founded in 1858, and was then the extreme point of European settlement in this part of Australia. As the outlet of the vast regions watered by the Fitzroy and its tributaries, it is even now a flourishing place, and pastoral occupation has already extended to the Peak Downs and to the shores of Broad Sound, fully two hundred miles farther inland and northward. The Queensland Government is about to found a new settlement at Port Denison, as the outlet of the recently proclaimed district of Kennedy, which will reach to within about three hundred miles of the Gulf of Carpentaria.

"Though Rockhampton is within the tropics, the climate of the neighbouring districts, especially on the upland downs and beautiful prairies of the interior, is in a high degree healthy and invigorating. Fresh settlers are fast arriving from New South Wales and Victoria, and bring their flocks and herds with them. Nor is the value of the wool of the merino sheep deteriorated to any sensible extent in these warm latitudes. What the fleece loses in weight it gains in softness and delicacy.

"It will afford some idea of the great space already covered by the settlements of this colony to mention that, on my official tours during the last twelve months, I have myself visited two flourishing towns in Queensland (Warwick and Rockhampton) which are distant from each other by the nearest road at least five hundred miles: that is, much farther than Galway and Kirkwall respectively are distant from London. There is something almost sublime in the steady, silent flow of pastoral occupation over north-eastern Australia. It resembles the rise of the tide, or some other operation of nature, rather than the work of man.

"Although it is difficult to ascertain exactly what progress may have been made at the end of each week and month, still at the close of every year we find that the margin of Christianity and civilization has been pushed forward by some two hundred miles."

The *Spitfire* was despatched by Governor Sir George Bowen last August to examine the north-eastern coast of Australia and to search for the mouth of the river Burdekin. She was placed under the command of Mr. J. W. Smith, who was accompanied by Mr. Dalrymple, Commissioner of Crown Lands; Mr. Stone, surveyor;

and Mr. Fitzallan, botanical collector. She sailed in August, 1860, and passed through the group of Northumberland Islands, which are described as presenting a most pleasing appearance. Their summits rise to 600 or 800 feet, and were clothed with acacias, gum-trees, cypress, laurel, and groups of a very beautiful and useful pine. The adjacent "Pine Islands" of Captain King formed unbroken forests of straight pines of large dimensions, and afforded an excellent harbour. These islands are visited by natives of the neighbouring continent, but are not permanently inhabited. The *Spitfire* next sailed to Port Molle, a very good harbour, but unfortunately shut in by a semicircle of mountains, so unbroken and covered with dense scrub as to cut off all apparent means of communication with the interior and make it useless for commercial purposes. Port Denison, the newly discovered harbour, was then sought and easily found. "Nothing could be more gratifying than the appearance of this splendid little port," sheltered from all winds. Starting from here, the coast of Australia was carefully examined for the mouth of the Burdekin. First, Cape Upstart was reached, where the anchorage was found open and useless, and the "Station Hill" of Captain Stokes was ascended, whence a clear view was obtained of a network of salt-water creeks, none of which could by any possibility be the outlet of the Burdekin. Hence the party sailed to the roadstead of Cape Cleveland, where the natives made such hostile demonstrations against them that they went on to Magnetical Island, opposite which a long unbroken ridge, running from the S.S.E., meets the coast, and affords no gap for the passage of any river. Again they returned to Cape Cleveland, and on searching its "inner western corner" found large entrances tending in the direction where, in the previous year, Mr. Dalrymple had left the Burdekin a broad running stream. These entrances were carefully examined. They were found to form a delta extending over 60 miles, and to present flood-marks at a height of 20 feet. None of them were accessible from the sea, except with great difficulty, and their exploration was the more dangerous owing to the attitude of the natives. Nevertheless, they were all traced, and found to converge in one point close to Dalrymple's furthest in 1859. No doubt, therefore, remained with the explorers that they were the outlets of the river Burdekin, and, at the same time, that they were utterly useless for the purposes of navigation.

The CHAIRMAN, in calling on the Society to thank the Duke of Newcastle for this communication, adverted to the highly prosperous and inviting condition of the new colony of Queensland, under the judicious and vigorous administration of his friend Sir G. Bowen, the Governor.

The third Paper read was—

3. *Expedition in South Australia.* By SIR RICHARD M'DONNELL, C.B., and Major R. WARBURTON.

HIS EXCELLENCY the Lieut.-Governor, Sir R. M'Donnell, started with a large party to inspect the newly-explored districts north of Mount Serle, and the result of his experience showed that there was greater difficulty in finding feed for his horses in the settled districts south of Angipena than anywhere else in his entire journey. He first inspected numerous mines, including the Appealina, Chambers', and Finch's, and the copper-mine near Mount Rose; then he started upon the more adventurous part of his journey, suffering everywhere from the extreme drought of the season. His course lay by Lake Weatherstone, Mount Attraction Springs, Blanche Cup, and Strangway Springs. These latter are nearly 100 in number, and are mostly formed on the same type as Blanche Cup: that is to say, they consist of stony mounds with reeds at the top and a hollow basin in the centre, containing water of a depth varying from a few inches to 6 feet, which either overflows the brim or issues from its side in a stream proportionate to the strength of the supplying spring. The water of Strangway Springs was abundant enough, but slightly brackish and ill-calculated to quench thirst. Here the party suffered severely from illness, originating previously, but developed by the intense heat. Nevertheless, they determined to push on still further to Loddon Springs, guided only by a sketch-map of Mr. Stuart, which that gentleman had lent to his Excellency. This attempt led the party into serious danger; for after 45 miles' travel across a succession of sand-hills and other difficult country, they could not for a long time discover the waters of which they were in search, and which they lighted upon only at the last moment, when they were on the point of undertaking the serious hazard of a retreat, with utterly exhausted men and cattle. His Excellency still continued his route to the interior for three days farther, when, having been absent long from the colony, his provisions failing, and an accident having happened to one of his best horses, he reluctantly returned, and riding in long and rapid stages reached Adelaide in safety.

Major Warburton travelled from Fowler's Bay to the head of the great Australian bight, the neighbourhood of which he explored with very discouraging results. There is indeed abundant water among the sand-hills at the head of the bight, but hardly any is to be found elsewhere. He therefore pronounces the country west-

wards of Fowler's Bay as unfitted for occupation. He came upon Eyre's tracks, but found difficulty in identifying that traveller's positions, chiefly owing to an uncertainty as to the exact point which Eyre had considered to be the head of the bight. Major Warburton's explorations were carried on with so much toil that his exhausted party had difficulty in returning.

THE CHAIRMAN, in commenting on this communication, adverted to the energy displayed by the Governor, Sir R. M'Donnell, in his endeavour to satisfy himself, by personal examination, of the real state of large portions of the interior of S. Australia. He then called on the Fellows present who took an interest in either of the great colonies adverted to, to offer their comments.

MR. CRAWFURD believed that the colony of Queensland was capable of producing cotton for Manchester. They had more cotton in Lancashire than all the rest of the world, but they must have still more to satisfy their demands. Queensland really seemed to be adapted for the production of cotton; but unfortunately the climate was also adapted for the cultivation of the sugar-cane, and that might be a serious rival. As to the production of cotton, it was one of the plants that required but a small quantity of water; it was, in fact, what was called a dry-land product, and he had no doubt that the country would be found well adapted to its growth. He thought they had now sufficient evidence to show that the great mass of Australia was a mere desert, and he did not see how it could be otherwise. Different exploring parties had penetrated so far from the south and from the north, that one or other of those parties must have seen a range of mountains in the interior, if any such existed, of 7000 or 8000 feet in height; and as they had not, it must be concluded that mountains of that character did not exist. Yet without them there could be no water, and without water there could be nothing but sterility. Such was the case in every part of the world. Wherever such ranges existed water was always found, and water in the tropics meant fertility. India, for instance, would be a desert if it were not for its range of mountains. With respect to Queensland, he could not believe that it was as good a place for sheep as had been represented, as he thought the climate would be too hot. Queensland was in the latitude of Canton, and Canton was much too hot for sheep. However, of all the places he knew, he believed it was the most eminently adapted for the production of cotton. He had himself seen samples from there both raw and manufactured, and he had scarcely seen better specimens of either. What it would produce to the greatest advantage would most probably be that which was called sea-land; and a very considerable quantity of that fine kind of cotton from Georgia and South Carolina was used by our manufacturers. He considered that the samples from Queensland were quite equal to any he had seen.

J. BAKER, Esq., a member of the Legislative Council of Australia, said he should not have ventured to address any observations to the meeting, if it had not been for the remarks of Mr. Crawford that the centre of Australia was a desert. Now he differed entirely from Mr. Crawford, as he thought it was proved, by the late explorations of Mr. Stuart, that such was not the fact; and he should not be doing his duty to the country which he claimed as his home, if he listened to the statement without attempting to refute it. It appeared to him that the paper from Sir Richard M'Donnell had been the immediate cause of Mr. Crawford making his observations, recounting as it did the hardships Sir Richard M'Donnell had to endure, and the difficulties with which he had to contend. But Sir Richard M'Donnell was not a practised

explorer. He started with Mr. Stuart's maps in his pocket, but he lost his way, and, travelling round the wrong side of Lake Tibba, missed the Hermit range, for which he was aiming. Being disappointed in the water which was represented as existing in that neighbourhood, he examined Mr. Stuart's chart, and found the Hermit range with abundance of water by it. He (Mr. Baker) therefore thought it was not right to condemn the whole country as a desert, merely because Sir Richard M'Donnell had lost his way and had difficulties. There was no doubt that Sir Richard M'Donnell was entitled to great praise, and also to their sympathy for the hardships which it was represented he had had to endure; but what Sir Richard M'Donnell called fatigue and privation would very likely not be noticed at all by a man like Mr. Stuart, to whose labours he thought this Society could not award too high a meed of commendation. Mr. Stuart had himself said that much of the interior of Australia was quite equal in fertility and in rich picturesque beauty to the O'Halloran Hills, which were as lovely a part of country as could be seen. A great portion was under cultivation, producing all the cereals in the most luxuriant manner; and he thought the safety with which the exploring parties had made and returned from their expeditions to the interior proved that the country was not a desert. He, however, by no means meant to say that the whole of the vast interior would ever be profitable to work or hold. The banks of the river Darling, and much of the splendid tract of country through which it passed, were also as well adapted as the fertile plains of Queensland for the production of cotton. He considered that a few thousand pounds expended on the river, in the erection of four or five lock-gates, would not be thrown away, as it would render navigable upwards of 1000 miles of water, along the course of which there was a deposit of soil equal in rich abundance and luxuriance to that of the valley of the Nile, and capable of producing an immense quantity of cotton. If they thought their thanks were due to Sir Richard M'Donnell, what would they have to say with regard to Mr. Stuart? He contended that Mr. Stuart had already accomplished a victory, and was entitled to all the praise the Society could bestow upon him, even if he should die in the attempt to complete his discoveries in Australia.

LORD ALFRED CHURCHILL said he did not think his friend Mr. Baker had at all overstated the advantages of Australia as a fertile and good cotton-growing country, but these were especially great in respect to the new district of Queensland. With regard to the immediate products of Australia, which were so necessary for the manufacturers of this country, he scarcely knew any of them that were capable of being obtained more readily, and in larger quantities, than in the colony of Queensland. Australia now supplied 50,000,000 lbs. of wool a-year, and he had not the least doubt that, if the colonists took up the question of cotton-growing, they would do equally well with it. He certainly did not think, from what he had heard, that Queensland was at all too hot for sheep. The alpaca or llama of South America had now been introduced, and the animals appeared to thrive very well indeed. There was every reason to believe that important experiment would be successful; and if it should be so, flocks of those animals would add another and most profitable branch to colonial industry. There could be no doubt, from all the evidence they had heard, that immense tracts of country were pre-eminently fitted for the cultivation of cotton; and, in fact, there were few parts of Australia in which it could not be cultivated. The explorations of Mr. F. Gregory, on the northern and western side of Australia, were likely to be very beneficial in opening out new country whence more cotton could be obtained, and where coolie labour might be introduced for its cultivation. He thought the Society should do all in its power to encourage explorations of this nature.

MR. B. W. GEE said he had been some eight or nine years in Australia, and he could fully support the statements made by Mr. Baker. He had been

both in Calcutta and Queensland, so that he could judge of the relative merits of the two climates, and the advantages were incomparably in favour of the latter. The climate was unusually healthy, and the vegetation luxuriant beyond description. He had himself received honourable mention from the Commissioners of the Paris Exhibition for his samples of Australian cotton grown at Queensland, and he therefore knew what the young colony could do in respect to that cultivation. However, cotton required labour; and though he was an advocate for free, he was obliged to admit that convicts would do much more work in cotton plantations than any labourers whom the settlers could now obtain in the colony. He believed that if, under proper regulations and arrangements, convicts were sent to Queensland for ten years, there would be cotton enough coming from that district alone to supply all Manchester.

MR. CHILDERS, M.P., thought they owed a deep debt of gratitude to Mr. Crawford for eliciting the statement which had been made by Mr. Baker. He advocated the introduction of cotton plantations into Australia.

CAPTAIN DUCANE considered that, with respect to Western Australia, the expedition of Mr. Gregory was one of great hope, and, if successful, would be productive of great advantages.

MR. ROE, Surveyor-General of Western Australia, thought it a matter of great congratulation to the Society which had originated, fostered, and now brought to a successful issue, the expedition which he hoped had already started under their able leader Mr. Frank Gregory, who, he was certain, would do full justice to the task he had undertaken.

The CHAIRMAN congratulated the Society upon the discussion which had taken place. As to the observations in reference to Sir Richard M'Donnell and Mr. Stuart, he considered that no comparison had been drawn between them. No one had ever doubted that Mr. Stuart was entitled to the highest praise, and no one had stated this more decisively than Sir Richard M'Donnell himself.

4. *Latest Intelligence from the Expedition to the Sources of the Nile under Captains SPEKE and GRANT.*

THE intelligence from Captain Speke is of a fortnight later date than that which has already been communicated to the Society. It informs us that he had reached the upland districts, but had not yet arrived at the Rubeho Pass. All of his Hottentot guard had suffered severely from fever, and three of them had to be sent back invalided to Zanzibar. The rest of the party appear to be well.

Captain Speke sends back numerous lunar observations for the determination of the longitude of Zungomero, and speaks of having despatched an herbarium of plants.

The Meeting then adjourned to April 22nd.

Eleventh Meeting, April 22nd.

SIR RODERICK I. MURCHISON, VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*Lord Colville ; Rev. E. Graham Moon ; Vice-Chancellor Sir John Stuart ; Rev. W. H. Walker ; and John Anderson ; W. John Legh, M.P. ; Peter Morrison ; G. Moore Robertson ; and J. Ralph Shaw, Esqrs., were presented upon their election.*

ELECTIONS.—*The Rev. S. F. Cresswell ; Colonels John Gardner and Nicholson, R.E. ; the Hon. J. F. Stuart Wortley ; and James F. Beckett, R.N. ; Oswald Bloxsome ; G. Farmer Miller ; A. Fullerton Mollison ; J. Carrick Moore, M.A., F.R.S. ; and H. S. Dazley Smith, M.A., Esqrs., were proposed as Candidates for election at the ensuing meeting.*

ACCESSIONS.—Among the Accessions to the Library and Map Rooms since the last meeting were Vol. XII. of Reports, Explorations, and Surveys for Railroad from the Mississippi River to the Pacific Ocean ; American Almanac for 1861 ; Report of International Statistical Congress of 1860 ; Chart of the Arctic Regions ; Geological Survey Map of Victoria ; Maps of Iceland, Norway ; Continuation of the Ordnance Survey Maps, &c. &c.

ANNOUNCEMENT.—The Chairman expressed his regret that the President, Lord Ashburton, was detained by illness at home, and announced that the President's soirées would be held on the 15th of May and the 5th of June at Bath House, Piccadilly.

The Papers read were—

1. *Latest Intelligence from Dr. Livingstone and his Party in Central Africa.*

Communicated by Sir R. I. MURCHISON and Sir G. BACK.

FEELING in honour bound to take the Makololo back to their own country, and disliking to remain quiet while waiting for his new steamer, Dr. Livingstone left Tete on May 16, 1860, and travelled to Sesheke, a distance of some 600 miles. During their five years, sojourn at Tete, many of the Makololo had married slave women and had families. These Dr. Livingstone had expected would be disinclined to return with him, and he repeatedly gave them their option of remaining. However, they behaved badly, for they started in his company, and afterwards ran away on the march. The route of the party lay along the north bank of the Zambesi, crossing the mountain mass in which Kebrabrassa lies, and the rivers Loangua and Kafue at their confluences, then along the fine fertile valley of the Zambesi (being new ground) for about 100 miles ;

then turning westward in lat. $17^{\circ} 18'$ S. up a sandy river, the Zongue, till they saw the source of the fragments of coal strewn on its bed; then ascended about 2000 feet above the Zambesi, or 3300 above the level of the sea, where there was actually hoar-frost, and descended on the other side into the great valley of the Makololo. The columns of vapour from the Victoria Falls were seen by the naked eye at a distance of twenty miles, and the party went out of their way to visit them. Dr. Livingstone thinks he had understated everything about them except the height of the columns of vapour. The depth of the fall is not 100, but fully 310 feet. The breadth from bank to bank is not 1000 yards, but between 1860 and 2000 yards. On this occasion the river was at extreme low water, so that people could even wade from the north bank to Garden Island, to make a stockade for the protection of the seeds. The hippopotami had eaten up nearly all that the Doctor had planted on his previous visit. The lips of the fissure which runs across the river, and into which the entire body of water falls, are 80 feet apart opposite to Garden Island. The arrangement of the fissures is at first something like the letter T, the horizontal bar of the letter corresponding to the cross fissure, and the vertical stem to the commencement of a continuous series of zigzag cracks, at the bottom of which, far below the generally level surface of the land, the river takes its onward course. Sekeletu was found labouring under a skin disease, and many headmen had been executed for the alleged crime of having caused it by their witchcraft. A party of London missionaries had been to Linyanti, where, during a stay of only three months, six out of the nine Europeans which composed it perished: the remainder had left. Dr. Livingstone regrets that he had not been by to give them his long-tried remedies for fever. Returning to Tete, he visited the river twice between the Falls and Sinamanes, and on both occasions found it running at the bottom of a deep crack. He mentions that Mr. Moffat informed him that all the rivers in Moselikatze's country run N.W. or N.N.W., and that they enter the Zambesi above Sinamanes. Dr. Livingstone took canoes at Sinamanes, where the level of the Zambesi was found by boiling-water observation to be 1600 feet lower than at the Falls, and continued his route down the stream in order to examine the river at low water. Kausalo presented no difficulty; Kariba, a few miles below it, is a basaltic dyke, stretched across the stream, with a wide opening in it, dangerous for heavily-laden canoes, whose gunwales are only 6 inches above the water. At Mburumas there is a rapid of 100 yards in length, running at six knots an hour. This is the most rapid part that has been seen in the whole river. Below Chicova, four and a half knots had been the extreme rate at the time of the

upward journey, but on return to the same place the falling of the river had developed several dangerous rapids, and even cataracts. There would seem to be a trap-dyke here, like that of Kariba, but with two openings, through one or other of which the canoes must have passed. There was a large seam of fine coal in the bank at this place, and another in the bank at Manyerire Hill; besides seeing fragments of the mineral in many rivulets on both banks, the existence of the coal-field at Zambo was verified, and was found to extend nearly to Sinamanes. The only real difficulty in the river is that at Morumbua; and this could be passed in full flood, as a rise of 80 feet must smooth it over.

"On arriving here (at Tete, September, 1860) two days ago, we had travelled from Linyanti and back, some 1400 miles, the greater part on foot. We have thus kept faith with the Makololo, though we have done nothing else. We were swamped once, but the men behaved admirably, leaping out and swimming alongside, till we got into smooth water. In another place one canoe was upset and property lost. We then abandoned the canoes and came home on foot, thankful to say, 'All well.'"

The CHAIRMAN said their thanks were certainly due to Dr. Livingstone and his brother for the valuable communications which had been read. His distinguished friend Dr. Livingstone had been pleased to say that he had done little more than take his friends the Makololo back to their native region, but the gentlemen present who had heard the papers read would admit that he had added very considerably to their knowledge. And if Dr. Livingstone had done nothing more than realise the promise he made to the Africans that he would return and conduct them to their home, he had not only redeemed his pledge, but had raised the character of England throughout Southern Africa. Dr. Livingstone had given us a large amount of geological and mineralogical knowledge which would be very valuable. He (Sir Roderick) thought that while Dr. Livingstone was engaged in his explorations they should cheer him on, to show that his labours had been received with applause by the Royal Geographical Society, and that they wished to encourage him. He could not but congratulate the Government on having appointed Dr. Livingstone to be not only the British Consul at the mouths of the Zambesi, there to point out to British merchants what advantages might be derived from people dealing with the natives, but also for having accredited him, as it were, to the tribes of South Africa. Thus, he had power to proceed to the interior of that country, and there sow those seeds of civilization which would redound to the honour of the British name.

ADMIRAL SIR GEORGE BACK said it might be interesting to the meeting to know that Dr. Livingstone in a letter to him stated that the temperature in the Batoka country at three o'clock in the afternoon was 136 degrees, and the thermometer was often over 100 degrees on the shady side of his person; and furthermore, his blood showed a temperature of 99½ degrees, while that of the natives was only 98 degrees; but the most remarkable feature in the climate was the rate of evaporation, there being a difference of 33 to 36, and even 40 degrees, between the wet and dry bulbs of the thermometer. And then, as regarded the fatal fever from which both the Makololo and some missionaries had severely suffered, Dr. Livingstone had discovered a remedy

which had been found effectual in curing the disease ever since 1850. This he did not like to make a fuss about, notwithstanding the frequent opportunities that had occurred for testing its valuable properties.

CONSUL HANSON said,—However much the Africans might be divided into different tribes, there yet seemed to be an undercurrent which tended to prove that they were everywhere the same family. He felt that Dr. Livingstone had achieved a greater measure of success than, perhaps, any other European who had ever gone amongst the Africans with a view of understanding them. He had himself seen a great many Englishmen in Africa, and had noticed the different points of view from which they looked at the people. He believed that one part of the success of Dr. Livingstone was attributable to the temper of the man himself—that he looked at the people from the right point of view—he went amongst them, dealt with them, treated them with kindness and as men. Men of different temperaments would, perhaps, have spoken of them as uncivilised, rude, barbarous, naked savages, who were beneath contempt; but it was not so with him. Dr. Livingstone knew that, though he went to further the purposes of this Society, he had also another and higher object in view, and that was, to diffuse amongst them the glorious light of the Gospel of his blessed Master; and he (Consul Hanson) believed that wherever travellers treated the Africans with kindness and with courtesy they would in like manner be met with kindness, hospitality, and favour. It was because Dr. Livingstone had ever kept faith with them that they on their part kept faith with him; and he believed that the same kind of feeling would continue mutually to exist.

The second Paper read was—

2. *Communication from Bishop Mackenzie, of the United University Central African Mission, to Sydney Strong, Esq.*

BISHOP MACKENZIE arrived off the Kongone mouth of the Zambesi early in February, where he found not only Livingstone and his associates, but also the remainder of his own party who had preceded him in Livingstone's new steamer, the *Pioneer*. Livingstone was about to start immediately to explore the Rufuma river, in hopes of discovering by its waters a more convenient access to the Nyassa and Shire district. He strongly urged the Bishop not to settle until that expedition had been completed; for there was no single chief to whom he could recommend him with confidence, and that if he landed his goods close to the sea-shore, the persons in charge of them would be sure to take fever. Yielding reluctantly to these and other reasons, it was agreed that the Bishop and one companion should join Livingstone's expedition up the Rufuma, and that the remainder of the missionary party should await their return at Johanna, one of the Comoro Islands, and perfectly healthy. This determination was at once carried into effect, and the parties went on their several routes without delay.

After a few concluding observations by the Chairman, the meeting was then adjourned to May 13.

Twelfth Meeting, Monday, May 13th, 1861.

LORD ASHBURTON, PRESIDENT, in the Chair.

PRESENTATIONS.—*The Rev. W. D. West; Colonel James Holland; Captain D. Nasmyth; and J. Allen Brown; and R. Broadwater, Esqrs., were presented upon their election.*

ELECTIONS.—*Colonel John Lardner; Lieut.-Colonel Lothian Nicholson, R.E.; the Hon. J. F. Stuart Wortley; and James F. Beckett, B.N.; Oswald S. Blozsome; Rev. F. S. Cresswell; George Farmer Miller; Alexander F. Mollison; John Carrick Moore; and H. S. Dazley Smith, Esqrs., were elected Fellows.*

The Paper read was—

Journey from Jeddo into the Interior of the Island of Nipon, with Ascent of the Volcano of Fusi-yama. By RUTHERFORD ALCOCK, Esq., H.M. Minister in Japan.

Communicated through SIR R. I. MURCHISON.

THERE are usually but two months in the year—July and August—when Fusi-yama is sufficiently free from snow to admit of being ascended. August had already passed, while Mr. Alcock was still engaged in removing obstacles put in his way by the Japanese ministers with felicitous invention and remarkable persistence. It was not considered dignified for him to go there, as the lower class of people were those who chiefly made the pilgrimage, and the roads were described as unsafe, and so forth. The Japanese have exerted all their ingenuity to nullify that clause of the treaty which allows liberty of travel to members of the legation. However, Mr. Alcock succeeded in making his arrangements to start, and as soon as it was absolutely fixed he should go, great pains were taken to render his journey agreeable. He travelled with eight Englishmen and a very large cavalcade along the high road, by which the Daimios travel every year to and from the coast, for their forced residence of six months; and where the mountain-passes of Hakemi, 7000 feet above the sea, are strictly guarded, to prevent news being conveyed by their followers to the capital, or the wife or female child of a Daimio being taken out with him, as these remain hostages during his absence. Clean and spacious houses for the accommodation of the Daimios were erected along the road. The way was exceedingly beautiful; generally a gravelled avenue running through cultivated plains and valleys, where, though there is no freedom of the press or of speech, but a system of universal

espionage with Draconian laws, the peasantry are happy-looking, and notable for their careless freedom. Mr. Alcock says, "Greater evidence may be seen in the British Isles, any day of the year, of misery, destitution, and discontent, than I have been able to discover during a long residence. It is difficult, indeed, to reconcile all these tangible signs of material prosperity and well-being with an essentially bad Government, and equally impossible to doubt that, in many respects, if not in all, the mass of the population is much to be envied, even when brought into comparison with nations of the Western Hemisphere; with or without Free Press, Free Trade, Liberty of Speech, Representative Government, Trial by Jury, or any other Palladium of the Liberties of the People." However, the Japanese are sad story-tellers.

The mountain-passes of Hakoni reminded Mr. Alcock of the Swiss valley of Lauterbrunnen, and one dense forest of luxuriant trees and shrubs lay from the valleys to the highest summits. Crossing Hakoni and descending on the other side, the foot of Fusiyama was attained. The horses were left behind after part of the mountain had been ascended, and the rest of the way, about eight hours' climb, was performed on foot. The top is a crater, long since extinct, some 1100 yards in length, and the highest peak was calculated by boiling-water observations at 14,177 feet above the sea. The Japanese pilgrims who ascend it, do so in white dresses.

Returning homewards Mr. Alcock crossed the Hakoni range at another point, and visited Atami, where there are numerous sources of steam and sulphureous water, ejected in irregular explosions.

Mr. Alcock enriched the sketch of his journey with a valuable and elaborate account of the history and political condition of Japan, and concluded it with an Appendix, on the Vegetable Productions of Japan, by Mr. Veitch, who accompanied the expedition.

The PRESIDENT said they had on that occasion the pleasure of seeing amongst them a distinguished public man, to whose decision and energy the treaty was to be attributed. Lord Elgin had not only seen Japan itself as well as its people, but had had the advantage of mingling with its public men, discussing questions of public interest, and making himself acquainted with subjects of a political and economical character, and he hoped Lord Elgin would give them some account of that which he had seen.

The EARL OF ELGIN wished most unaffectedly to say, that it would give him the very greatest pleasure if he thought he could contribute any information whatever that would be worthy their hearing, in addition to the interesting and very instructive paper which they had just heard read. But, in truth, he came there quite as much to listen and to learn as any individual present; and if he obeyed the summons of the noble President, he did so simply in order that he might, with much regret—he must say some contrition—plead his inability to give them the information which they supposed he could furnish. The truth was, that he had the satisfaction of being one of the pioneers of

England at Yeddo; but all knew that it was not from those shaggy beards and leather aprons that they could expect to get geographical information, and he must say that he always felt the necessity of great caution in offering hasty opinions with respect to foreign countries. His Lordship then explained how they were conveyed to their station by his gallant friend Captain Osborn, who conducted them successfully not only through the storms which prevailed about the coasts of Japan, but who had also furnished a full and detailed report upon the subject. His Lordship said that, as regarded himself, he must remind them that he was only a fortnight at Yeddo, and he was only a very short time in other parts of the country; and he thought they would believe him when he said that his time was so much taken up with his official duties, that he was able to obtain but little information of a different kind, but he would say that there was no place he had seen that so much surpassed his expectations as Japan. There was a neatness about all their arrangements, a cleanliness about their habits, a finish and a perfectitude about their work, an aptitude to do it, and a readiness to take up any of the results of civilization, which was perfectly astonishing. With respect to his own duties, for instance, he never met with diplomatists who were more shrewd, and he might also say that he never met with a greater readiness to take up a joke and enjoy it. He was bound to say that whenever he got into a difficulty with the diplomatists of Japan, the readiest way to get out of it was to make a joke. His Lordship illustrated the truth of his remarks by anecdotes; after which, he expressed his opinion that if they treated the people of the country to which he referred in a kind way, and did not ride rough-shod over them, no difficulty would be experienced. He was prepared to say that neither in the Japanese nor the Chinese treaty, was there a clause that was injurious to the people. It was true that there were some clauses which might be said to run counter to their habits and prejudices, and perhaps it was desirable that there were habits and prejudices of which they ought to get rid; but when they were running counter to their prejudices, they should do it with kindness. As to the trade with Japan, it was much greater than had been expected. He was told, while in China, that there would be 7000 bales of silk sent from Japan this year. The Japanese silk was superior in quality to that of China. Of course, it was natural that it should take some time to develop a country which had been for 200 years shut out from intercourse with other nations, and had for that long period existed on its own resources. Still there was a disposition to take goods, but the Government had put in force sumptuary laws to prevent them. He thought it was very likely that they should soon have a very great and flourishing trade with Japan, and he could not but think that the state of things in Japan was favourable, and would be for the benefit of this country. His Lordship then concluded with a few remarks on Chinese affairs, in the course of which he paid a hearty tribute to the personal character and great courage of Mr. Parkes.

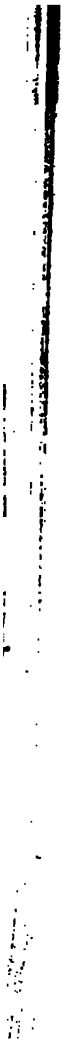
CAPT. SHERRARD OSBORN said that as Japan was now being opened, he felt more and more convinced that, apart from a little tendency to colour which prevailed, the facts proved every day that the statements which had been made were correct. The extraordinary way in which the writer of the paper mentioned the existence of the arts, the vast number of houses, the state of agriculture, and the wonderful energy displayed by the people in the arrangement of every thing, whether the clipping of trees or cultivating the soil, must have struck every one. It was perfectly astonishing to see what their industry had done in cultivating the beauties of God's works. It was the *finish* of what they did which struck every one.

MAJOR BIDDULPH said he was at Yeddo for ten days, and he passed afterwards through the inland sea of Japan. Nothing could be more interesting than what he saw when passing through it. The shores were

covered with villages, boats were plying from one side to the other, the islands were covered with evergreens, which, though it was in the midst of winter, gave them quite a luxuriant appearance.

THE PRESIDENT said they would perhaps allow him to refer to one expression which had fallen from Captain Osborn, and that was with respect to the way in which the people cultivated God's works—or to the pleasure which they felt in decorating their mother earth. He was sorry to say that they saw comparatively little of that feeling in Europe. Lucre was generally the great object which the people had in view, and the decoration of the earth was not attended to as it ought to be. He thought there was evidence of want of civilisation and refinement in its neglect. They must all feel that especial thanks were due to Mr. Alcock, and also to Lord Elgin for his remarks. Unfortunately, in dealing with other races, the disposition "I am a Roman"—*Romanus sum*—prevailed among our countrymen to too great an extent; but he hoped that the spirit of disregarding the disposition and the feelings of the people would not be encouraged by our authorities in Japan.

The meeting was then adjourned to the Anniversary, May 27th.



PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.

SESSION 1860-61.

Thirteenth Meeting (ANNIVERSARY), 1 P.M., *May 27th*, 1861.

IN the absence of the President, Lord Ashburton, the Chair was taken by SIR RODERICK I. MURCHISON, VICE-PRESIDENT.

The Minutes of the previous Meeting having been read and confirmed, and the regulations respecting the Anniversary Meetings having been read, the Chairman appointed J. Lyons M'Leod and J. Allen Brown, Esqrs., Scrutineers for the Ballot.

Lieutenant Langham Rokeby, R.N.; the Hon. Wellington P. Manvers Chetwynd Talbot; William Aubyn; David Balfour; William Blenkin; Charles Butler; George Frederick Chambers; J. Coghlan; Thomas W. Duprée, M.D.; Henry Edwards; John Bromley Foord; John Gallagher, M.D.; Charles Hall Hall; Alexander Hector; James Stewart Hodgson; James Lamont; Alexander Ogilvie Lloyd; Arthur Pemberton Lonsdale; Junius Spencer Morgan; Lonsdale Pounden; William Severin Salting; Joseph Travers Smith and Henry Thurburn, Esqrs., were proposed as Candidates for election at the next Meeting.

The Report of the Council, with the Balance Sheet for 1860, and the Estimate for 1861, was then read and adopted, and the two motions,* as recommended by the Council at pp. 6 and 7 of the Council Report, were, after some discussion, carried.

The Chairman then delivered the FOUNDER'S GOLD MEDAL to the Earl de Grey and Ripon, on behalf of Captain John Hanning Speke, of the Indian Army, for his eminent geographical discoveries in Africa, and more especially for the discovery of the Great Lake Victoria Nyanza; and the PATRON'S GOLD MEDAL to the Duke of Newcastle, on behalf of John Macdouall Stuart, for his explorations

* Viz., That the Election of Fellows should henceforth be by the Council and not by the Society, and that the 'Proceedings' should in future be edited by the Honorary Secretary.

in the interior of Australia, and particularly for his last journey from South Australia to the water-parting of Northern Australia.

The Anniversary Address was next read by Sir Roderick Murchison, and a unanimous vote of thanks was subsequently passed by the Meeting, with a request that he would allow the Address to be printed.

At the conclusion of the Ballot, the Scrutineers reported that the following changes, advised by the Council, had been adopted:—The Earl de Grey and Ripon retiring from the Vice-Presidents, to be succeeded by Major-General J. E. Portlock; and the vacancies among the Ordinary Councillors occasioned by the retirement of Sir Benjamin C. Brodie, Bart., the Hon. F. G. H. Calthorpe, M.P.; A. J. B. Hope; Laurence Oliphant; H. D. Seymour, M.P.; E. Osborne Smith, and by the decease of J. A. Warre, M.P., Esqrs.; to be supplied by Lord Alfred Churchill; Lord Colchester; Colonel J. H. Lefroy; Major-General Sir Henry Rawlinson; Sir Justin Sheil; Count P. E. de Strzelecki; and Colonel Sir A. Scott Waugh.

Thanks having been voted to the President, Vice-Presidents, Members of Council, Auditors, and Scrutineers, the Chairman finally directed attention to the usual Anniversary Dinner, and the Meeting adjourned.

PRESENTATION
OF THE
ROYAL AWARDS

TO CAPTAIN SPEKE, THE DISCOVERER OF LAKE NYANZA; AND
MR. MACDOUALL STUART, THE EXPLORER OF CENTRAL
AUSTRALIA.

At a previous anniversary it was made known by the Council that in awarding one of our Gold Medals to Captain Burton for his various adventurous explorations, we also fully recognised the high merits of his coadjutor Captain Speke, not only for his geographical labours in laying down their joint map, but also for his independent discovery of the Lake Nyanza Victoria. Had not the Council then desired to divide its honours between the leaders of discoveries in Africa on the one hand, and in North America on the other, there can be no doubt that Burton and Speke would have been simultaneously honoured.

As it is, however, we now have it in our power to give to Captain Speke precisely the same honour which was conferred last year on Captain Burton. Our satisfaction in doing this is increased by knowing that the man we now honour is at this moment employed by the Royal Geographical Society, assisted by Her Majesty's Government, in one of the most arduous enterprizes which was ever contemplated. For if Captain Speke, with his gallant associate Captain Grant, should succeed in defining the whole of the Lake Nyanza, and should be able so to pass northwards as to join Consul Petherick on that southernmost portion of the White Nile, up to which boats and canoes can transport provisions from the north, then truly he will have laid open a vast portion of the interior of Africa hitherto entirely unknown. Whether, indeed, he may be able to determine (even with the aid of the bold and successful Petherick) what may be truly the remotest source of the White Nile, is very problematical. For the Lake Victoria Nyanza, along the banks of which he will proceed, must doubtless be fed by affluents, some of the most powerful of which may descend from the lofty chain of Kenia and Doengo-Engai on the east, and others from the so-called Mountains of the Moon on the south-west.

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In this point of view, many a year may elapse before the geographer will be able to trace to its spring-head the largest of these countless affluents. But looking to the White Nile as a gigantic stream which flows directly from south to north, and is subtended and barred in by flanking chains, it will be a sufficient triumph for this our expedition, if Speke can but prove to us, as he has indeed suggested, that his Lake Nyanza Victoria does so range from south to north as to be in direct communication with, and in the same meridian as the Upper White Nile, into which it is supposed the stream descends by cataracts from the water-parting near the Equator, through the Nyanza Victoria.

If Captain Speke should work out this important feature of the mission we have confided to him, he will assuredly reap a scientific glory from his exploits at the sources of the Nile, and thus be entitled to share the honour of the anagram applied to the illustrious Nelson after his victory at the mouth of that classic stream,—

“Honor est a Nilo!”

Sir Roderick Murchison then addressed Earl de Grey in these words :—

“MY LORD,—I have naturally great pleasure in requesting your Lordship, who sat in this chair so recently, and who now occupy so distinguished a post in the government of India, to receive this our Founder's Medal for Captain Speke, a gallant officer of the Indian army.

“As you are quite familiar with the merits of Captain Speke, and are acquainted with the undaunted zeal with which he and his brother officer, Captain Grant, also of the Indian Service, are now endeavouring to trace the sources of the Nile, your approval of their labours will assuredly be most grateful to the feelings of these explorers and their relatives at home.

“I will not ask you to transmit this medal to Captain Speke; for although an Anglo-Indian army did once pass through Lower Egypt, I apprehend that, even the colossal power of the Administration of which you form a part, might fail in catching our Medalist on his way to his lake Nyanza Victoria; but I request you to convey to the parents of the absent traveller this token of our good will and regard for what he has already accomplished, with the expression of our earnest hope that he may be entirely successful in his present noble endeavour.”

Earl de Grey replied by expressing the very great pleasure he experienced in accepting, on behalf of Captain Speke, that symbol of the high estimation in which the Royal Geographical Society held the services he had rendered, and was still rendering, to geo-

graphical science. He cordially and entirely concurred in the course which the Society had taken in awarding that medal to Captain Speke. As President of the Society last year, he had the gratification of presenting a similar medal to Captain Burton, also an officer in the Indian army; and connected as he (Earl de Grey) now was with the Indian-office, it was a source of pleasure to him to think that officers of the old Indian army were amalgamating with the rest of the service without yielding any portion of the honourable heritage which, as travellers and geographers, seemed to be pre-eminently their own.

The Chairman then continued: The Patron's Medal has been adjudicated, as you have just heard, to Mr. MacDouall Stuart, for his great and successful explorations in the interior of Australia. When we reflect upon the many endeavours which have been made to traverse the interior of this vast continent, and the partial successes only which have attended the efforts of the most justly distinguished of those explorers, we must at once admit that never was our Gold Medal more worthily bestowed than on this occasion. Of all the precursors of Stuart, the champion in this field of toil and adventure has been Sturt; for even in the year 1837 that distinguished topographer, proceeding from the south to the north-west, reached s. lat. $24^{\circ} 30'$, e. long. $137^{\circ} 59'$. Then it was that, when arrested by arid, saline wastes, in which no drop of fresh water could be detected, Sturt taught one of his subordinates, whilst braving such difficulties, and during such perilous and exhausting journeys, to lay down the precise geographical position of every mountain, valley, or river, and to mark the exact width of every desert tract of "scrub" that separates those oases from each other which are fertilized by fresh-water springs.

As the surveying officer thus instructed was our Medallist of this day, who has now surpassed his old chief (by reaching s. lat. $18^{\circ} 46'$ and e. long. $135^{\circ} 52'$, or 447 English miles farther to the north-west), let us, in honouring the last prizeman, never cease to recollect that, unless there had been a Sturt, to whom we formerly also gave our medal, there might not for many a day have arisen a MacDouall Stuart! It is thus that the value of our honours is recognised, and that, acting up to the motto "*Præmiando incitat*," we increase and score up the new triumphs of advancing knowledge.

From his previous surveys, then, our Medallist had satisfied himself that in the easterly meridian on which Sturt had endeavoured to proceed from the south, all his efforts would be fruitless. We know not if he had then formed the opinion, that to the west of his former

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exploration there existed a great depression, which, extending northwards from Lake Torrens, constituted a saline band of some breadth; but we do know that his last discoveries have proved the existence of such an interior depression. Well aware, from the previous labours of Eyre, that the south-western coast-lands constituted an intensely saline region, and, from the actual efforts of Babbage, Warburton, and others, that the environs of Lake Torrens were also intensely saline, the lightly-equipped Stuart darted off to the north-west, and there discovered that fine range of well-watered hills which were alluded to at our last Anniversary. Subsequently indeed he demonstrated—what has not been dwelt upon except at a recent evening meeting—that the rivers proceeding from those hills of small elevation flow into the north and south depression above alluded to, and, becoming saline near their mouths, terminate in an extensive salt-water lake. With our present knowledge, therefore, we may infer that Stuart has fixed the western boundary of a low saline desert, on the eastern shores of which Stuart was arrested. Whether this desert may or not be found to extend much farther to the north, or whether it may be connected with the saliferous sandy tracts reached by Gregory in his efforts to penetrate southwards from the tropical region of northern Victoria, can alone be determined by future explorers. As far as exploration has gone there seems good grounds for believing, with Colonel Gawler, that there may be a vast region of interior lands to the west and north-west which may at some future day be occupied by our colonists.

In the meantime what a noble and successful effort has not MacDouall Stuart made to reach the northern coast—for he was within 245 English miles of the Gulf of Carpentaria—and how sincerely have we to thank him for having laid down his devious path so accurately on a map! No one, however, who has not completely read his diary can duly form an idea of the difficulties Stuart had to contend with, and of the invincible fortitude, talent, and sagacity with which he traversed the numerous intervening breadths of scrub and desert to reach a water-hole. Many of the tracts around these springs will doubtless at no distant period be centres of the sheep and cattle pastures of our colonists. And if some of the largest and best of these tracts should fall to the lot of the individuals who originally furnished MacDouall Stuart with the funds and appliances to make these discoveries, let us say that Messrs. Chambers and Finke are richly deserving of that recompense. These gentlemen must indeed be viewed by us as the persons

without whose energy and well-employed capital we should not now have been recounting one of the most striking geographical exploits of modern times.

Having already penetrated to the water-parting of Central and Northern Australia, or where the rivers flow either north-eastwards to the Gulf of Carpentaria, or north-westwards into Cambridge Gulf, MacDouall Stuart may be said to have all but traversed the entire continent from north to south. His present effort to complete that traverse will, we anticipate, be crowned with entire success; and we trust that he may already have reached that fertile tract at the mouth of the Victoria where Gregory's expedition was so long encamped. We are indeed informed by Mr. Chambers that MacDouall Stuart left Chambers' Creek on the 31st January, his party consisting of about 50 horses, with 8 men, and a second in command. He was provisioned for three months, and is to form a dépôt at Bonny's Creek, and, if possible, to strike the Victoria with a small party.

And here I cannot but regret that the suggestions offered by myself, in more than one Anniversary Discourse addressed to this Society, have not hitherto been followed up by any endeavours to form settlements on the north coast of Australia, wherein our fleets might find harbours of refuge, and where, in case of war, our armed forces would occupy a position flanking the whole of that Indian Archipelago in which Britain possesses such rich, vested interests. Had we already one such settlement only, and had thus substantially claimed as our own the northern shore of a continent of which we already occupy the other sides, then truly should we have rejoiced in the prospect that, whilst I now address you, our Medallist had reached a haven of repose. But, even as it is, no great gift of seerdom is required to prophesy that the mere passage to the north coast which has been effected by MacDouall Stuart will not only cause the occupation of the intermediate country, but will soon lead to the formation of regular settlements on the northern shores of this great British continent.

The Governor of South Australia, Sir R. MacDonnell, has already anticipated the establishment of a telegraphic communication across the continent, and this again will necessitate the occupation of stations on the north coast, by which the colony of Victoria, as well as that of South Australia, will have a much easier and more rapid communication with India than by the circuitous route of the eastern coast and the Torres Straits. And when this telegraphic communication from south to north is opened out across Australia,

may the first message transmitted by it be, "Honour to MacDouall Stuart!" *

Sir Roderick Murchison then addressed the Duke of Newcastle, Her Majesty's Secretary for the Colonies, in these words:—

"My Lord Duke,—As you have heard the reasons assigned for granting the Patron's Medal of this Society to Mr. MacDouall Stuart, and are, of course, well aware of the merits of that explorer, I may say that I am right glad to see your Grace present on this occasion, notwithstanding the great pressure of official business which is, I know, thrown upon you this very day. Your attendance here is, indeed, the most pregnant proof of the lively interest you take in the vast colonies of Australia.

"I am certain, therefore, that in transmitting the Victoria Medal, I hope by this evening's mail, your Grace will much increase the honour by adding to it the sanction of your own approbation.

"The President and Council are already deeply impressed with the conviction that you have on numerous occasions promoted the advancement of geographical science, by the communications you have sent from the Colonial Office, and I now have to thank you for taking this opportunity of testifying to the colonists of Australia, that you rejoice with the geographers of England in recognising the great and important services of Mr. MacDouall Stuart."

The Duke of Newcastle replied that it had afforded him great pleasure to obey the invitation of the President, Lord Ashburton, and attend for the purpose of receiving the medal, for two reasons—first, because he was anxious to testify his entire concurrence in the objects of this important Society, of which he was a humble member, and secondly to express on behalf of the Imperial Government, and more especially of the department over which he had the honour to preside, their entire approval and sympathy in the labours and exertions of that persevering and enterprising explorer to whom that memorial had been awarded. Sir Roderick Murchison had alluded to the former exploits of Captain Sturt, the predecessor of Mr. Stuart in the field of Australian enterprise. He (the Duke of Newcastle) was sure there was no man who would feel less jealousy at the success of Mr. Stuart than that eminent individual. Mr. Stuart commenced his exploration under the auspices of Mr. Chambers, who provided funds for that purpose. He returned in August, 1859, from one of his expeditions, having reason to believe

* The bay at the mouth of the Victoria River is 15° south of the equator, and our countrymen, under Gregory (encampment of Mr. Wilson) were there for eight months, and enjoyed perfect health. If it be objected that Europeans will suffer too severely from the climate to carry on works on the coast of North Australia, it may be suggested, that the chief labourers may be Chinamen or Coolies, to work under English direction.

he should eventually succeed in the object he had in view. Starting again with fresh means and appliances, he ultimately succeeded in reaching a point 100 miles further north than that to which Mr. Gregory had penetrated, when he was stopped by the hostility of the natives. He had travelled a distance of 3000 miles, and undergone great hardships, having, for instance, on one occasion passed 101 hours without water, under a burning sun; and, although he had been driven back by the natives, he might fairly be considered to have accomplished the object he had at heart, which was to strike the north coast somewhere near Cambridge Gulf. It would be out of place at that moment to raise any controversy on such a subject, but as the Chairman had raised the question he must remark that the result of Mr. Stuart's exertions, and the anticipations they held out for the future, convinced him (the Duke of Newcastle) that the Government had for the present done right in not forcing colonization on the northern shores of Australia. He anticipated that those shores would now very soon become peopled, though there might be some difference of opinion as to the best means by which that could be done. The last account of Mr. Stuart was that he was about to start again, and the only circumstance which he (the Duke of Newcastle) regretted in connexion with the expedition, upon which by this time Mr. Stuart must have entered, was that he had gone alone, without scientific companions. But he anticipated that Mr. Stuart would be successful even without those companions, and he should have great pleasure in transmitting the Society's medal to him by the mail which would leave England that day, conscious as he was of the eminent services which that gentleman had rendered to geographical science, and to the colony and his country at large.

Reward for the best Reflecting Instrument.—The Society, last year, recognizing the importance of reflecting instruments to geography, offered a reward of 50*l.* for the best instrument of that description. Representations have, however, been made that sufficient time was not allowed for proper competition: the Council have deferred the award for another season. In the mean time a sextant has been deposited in the Society's office by Messrs. Elliot, which, in addition to other improvements, comprises a stand of great portability.

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

Delivered at the Anniversary Meeting on the 27th May, 1861,

BY SIR RODERICK IMPEY MURCHISON,
VICE-PRESIDENT.

(In the absence of the President, LORD ASHBURTON.*)

GENTLEMEN,

As our respected and noble President, who has truly the interests of our body at heart, has been suddenly compelled to leave London for the north of Scotland, on account of the alarming illness of the noble chieftainess, his lady's mother, whose loss, if it should occur, will grieve many a Highlander besides myself, I am unexpectedly called upon to resume my old place, and act as your President. Under these circumstances you will, I am sure, grant me more than the share of indulgence which you have bestowed upon me on many former occasions.

You will readily comprehend that I could not have prepared the elaborate materials which form the bulk of the Address which lies before me. This address is indeed chiefly made up, as our President would have told you had he been here, from the contributions of the several geographers to whom he appealed; and my duty will be mainly confined to the selection of a few of these materials for reading.

I will, however, add some passages of my own to what I have already read to you on the adjudication of the medals; and these, with a very brief conclusion, constitute all that the short space of

* The President, Lord Ashburton, was suddenly called to the north of Scotland by the alarming illness of the Hon. Mrs. Stewart Mackenzie of Seaforth.

time at my disposal permitted me to accomplish. I regret this the more because I feel certain that if Lord Ashburton had been present he would have efficiently directed your attention to other subjects of practical usefulness and importance, which are intimately connected with the progress of this Society.

OBITUARY.

IN opening this discourse in the usual manner with a sketch of the lives of those Fellows who have been taken from us, I naturally commence with a notice of the most important of the losses we have to deplore, in that of the late George Hamilton Gordon, Earl of **ABERDEEN**. Born in 1784, and educated at Harrow, he graduated at St. John's College, Cambridge; and already in 1802, being then only eighteen, visited Paris, in company with a young collegian, **Mr. Whittington**. He there formed the acquaintance of our esteemed and venerable Associate, **Mr. Hudson Gurney**, with whom, in the subsequent year, he travelled into Italy. From Naples, as **Mr. Hudson Gurney** informs me, Lord Aberdeen proceeded to Constantinople, Sir W. Drummond being then the British Ambassador at the Porte. Thence he made his celebrated tour in Greece, and, coming home in 1804, was married in 1805. Lord Aberdeen attained to public distinction very early in life, for he had the Order of the Thistle conferred upon him when he was only twenty-four, and was appointed Ambassador to the Emperor of Austria at the age of twenty-nine years.

This is not the place in which the higher qualities and great characteristics of this distinguished statesman can be appropriately recorded. It is not here that we are entitled to trace, as was eloquently done in a powerful daily journal,* all the main features even of his public career. The full treatment of these topics belongs to the historian. Nor are we capable of analyzing the merits of the antiquary, "The travelled Thane, Athenian Aberdeen"—the man whose classic attainments and sound appreciation of the fine arts rendered him for so many years a chosen arbiter in all matters of good taste, whether in architecture or sculpture, and constituted in him an invaluable trustee of the British Museum. But while I am incapable of doing justice to the public services of such a man, I have

* See 'Times,' 15th Dec., 1859.

fortunately had put into my hands just as I take the chair, the following sketch of Lord Aberdeen's great actions, which I gladly avail myself of, as a truthful and appropriate tribute from our President, Lord Ashburton, who knew him well, and loved him much.

"Lord Aberdeen's first responsible service was the negotiation with Austria, by which he succeeded in detaching that Power from the French Alliance. He was present with the Allies during the whole campaign, from the battle of Dresden to the occupation of Paris; assisted in their councils, and did much to impart union and vigour to their operations. When Lord Castlereagh, by the threat of withholding British subsidies, decided the Allies to march upon Paris, and thereby finish the war; and when, at a later period, to rescue Poland from the grasp of Russia, he broke from the Holy Alliance, and formed a league with France to resist that usurpation by force of arms, Lord Aberdeen acted as his subordinate; and yet Lord Castlereagh was held up to the country as a slave of the Holy Alliance. Lord Aberdeen, his pupil and friend, has been, with like injustice, represented as the submissive tool of Russia and of France. But what were the facts? When, in 1829, Nicholas invaded Turkey, crossed the Balkan, took Varna, and seized on Adrianople, Lord Aberdeen exerted all his influence to induce France and Austria to interpose; and, when they refused, he sent a British squadron to the mouth of the Bosphorus. In 1843 the French Government refused to pay the Pritchard indemnity; the Chambers took part with their Government, but both Government and Chambers yielded to the stern insistence of the British Minister. There was a harmony between Lord Aberdeen's acts and his professions seldom to be found in public men, for his was a mind singularly devoid of guile, prejudice, and vanity; free, in short, from those disturbing influences which too often overbear the principles of ordinary politicians.

"He professed the doctrine of non-intervention, and we find him accordingly opposing restrictions of every kind; restrictions on conscience, restrictions on trade, as well as those minute and vexatious regulations of labour, imposed of old by ignorance, or suggested at present in the name of humanity. In the same spirit he was opposed to any interference in the domestic policy of foreign nations; not from indifference to misgovernment and oppression, but from the absolute conviction that by such interference neither misgovernment nor oppression could be redressed. We find accordingly that Lord Aberdeen discouraged a revolt which he was not

prepared to support; and, as a proof of his political integrity, let me add that he never fostered a popular delusion to gain a party triumph. He resisted the Ecclesiastical Titles Bill, and deplored the cry which it resulted from. He opposed the Russian war; posterity will better judge of that act of his than we can at the present time, who have not yet felt its full consequences.

“Lord Aberdeen was an honest public servant, a far-seeing and consistent statesman, a faithful friend, a delightful companion, exemplary in all the relations of private life; and when, in future times, the mists of prejudice and party spirit shall have passed away, it will then be acknowledged that he was far more liberal, far more consistent and enlightened than many who now profess themselves the exclusive champions of civil and religious liberty.”

With a formal exterior, Lord Aberdeen was endowed with a warmth of heart and largeness of views which few but his intimate friends could appreciate. In this assembly it is, indeed, gratifying to have made it known that the oldest of his friends was one of our Fellows, who still survives, and continues to diffuse knowledge and comfort around him. That learned and benevolent man (Hudson Gurney) gives this summary of the character of his early companion, and with whom he continued on terms of intimacy through life: —“I look upon Lord Aberdeen to have been the most perfectly honourable, excellent, and truthful man I ever knew, and who has left the fearful question whether such a one can ever long be Prime Minister of England. No one ever more attached those who came in contact with him. But the degree of his natural constitutional shyness was incredible, and to the last it was most marked how he always, in mixed company, would gather to the people whom he knew, thus diminishing his general popularity.”

The highest tribute, indeed, to the memory of Lord Aberdeen is, that our gracious Queen so deeply felt his value as an enlightened, honest, and firm friend, that whilst during his life she gave him the strongest proofs of her friendship, she also honoured his obsequies with especial marks of her affection.

The feature, however, in his truly liberal character which most distinctly connects Lord Aberdeen with this Society is, that he was the Prime Minister who, upon my own representation, perceived the desirableness of granting an annual sum of money to maintain our Society in perpetuity, and thus constituting it the map-office of the nation.

Admitting that no scientific body could have stronger claims upon

the consideration of the Government, most willingly did he approve of the motion of that honest economist, Joseph Hume, at whose instigation the House of Commons voted the grant which first enabled us to meet the difficulties of a rising Society, and which has since been continued to us annually.

I have often dwelt on the good influence exercised upon our prosperity by this grant, obtained under the administration of my illustrious and noble friend, for it was the turning point of the great advance we were destined to make; and, although it be but a small item in the many virtues of a great statesman, it is one which will always endear the name of Aberdeen to every geographer.

George BRAND was born at Arbuthnott, in Aberdeenshire, in 1816. He was educated at King's College, Aberdeen, where he gained several University prizes, and took his degrees as Master of Arts. He commenced his career as a public servant by accepting a civil appointment in Her Majesty's Navy, and serving two years in H.M.S. *Madagascar* on the west coast of Africa, winning for himself the esteem of all with whom he was associated. Mr. Brand entered the service of the Foreign Office in 1844, by being appointed Vice-Consul in the province of Angola by the late Earl of Aberdeen, then Secretary of State for Foreign Affairs. During a residence of nine years at that place, his zeal in the service of his country, the great attention he devoted to the subject of the trade and resources of Angola, and the worthy use he made of his influence and opportunities in suppressing the slave-trade, and promoting the cause of British mercantile interests, elicited high encomiums from the several distinguished statesmen who presided over the department of Foreign Affairs. In 1853, having suffered much from African climate, Mr. Brand was obliged to return to England, where, continuing to devote himself to African subjects, he became the author of various Reports, at the request of Her Majesty's Secretaries of State, including a very able one upon the Decree of the Portuguese Government for Registration and Emancipation of Slaves in the Colonial Possessions of Portugal.

In June 1859, having failed in obtaining an appointment elsewhere, he accepted the Consulate of Lagos in Western Africa, where, having discharged its duties during a brief residence with great judgment and skill, his career was brought to an early close. He died at sea, on board Her Majesty's steamer *Alecto*, having

embarked in that vessel in hopes that change of air might have restored him to health.

John BROWN, the zealous and unbiassed chronicler of the deeds of our Arctic heroes, who has just passed from us, was one of the earliest members of our Society, having been connected with it since 1837. Born of an old Kentish family, on August 2, 1797, he entered the service of the Hon. East India Company, in which capacity he made several voyages, until a weakness in sight, and other causes, compelled him to leave the sea. A love of geographical research, for which he had always been remarkable, now grew into a passion, and under its influence he became especially drawn towards a subject in which he never afterwards ceased to feel the deepest interest, viz., that of arctic and antarctic discovery. Mr. Brown entered with much ardour into the question of a North-West Passage; and, in later years, the fate of the heroic Franklin and his noble companions became to him subjects of heartfelt interest and earnest inquiry. In many papers published in 1850, he never ceased to urge that the instructions given to Franklin were the only clue by which he might be found, and that the regions hitherto explored had not been in the direction indicated by them. He showed by very just reasoning that, in consonance with these instructions and the ascertained flood-tides and currents of those regions, the missing expedition must be found "between Cape Walker, on the north-east, Bank's Land, to the north-west, Wol-laston Land, to the south-west, and Victoria Land, to the south-east;" a deduction since almost literally verified. It was in 1858 that he published his well-known book entitled 'The North-West Passage, and the Plans for the Search for Sir John Franklin.' In 1843 he was among the founders of the Ethnological Society, and in 1847, having communicated some valuable information connected with various Runic monuments found in England to the Royal Society of Northern Antiquaries, Copenhagen, he was elected a *membre-fondateur* of that Society. The interest he took in archæology led him also to become associated with various other Societies connected with antiquarian research.

As indicative of the kindly nature of our deceased Fellow, we conclude these brief remarks with quoting some lines intended for inscription on a monument, about to be erected over his grave by a few sorrowing friends, who were extremely well acquainted with him, and deeply mourn his loss:—"Simple and true of heart, of rare intellect and distinguished attainments; an able and conscientious

administrator; a faithful friend: he was in life and death a true disciple of his Saviour, in whom alone he trusted."

Dr. BUIST was born at Tannadice, Forfarshire, on the 17th November, 1805. At twelve years of age he was sent to St. Salvador's College, St. Andrew's, enrolled as a student, and educated for the Church, to which he was licensed as a preacher in 1826. However, he disliked the profession, and became editor of several newspapers in succession; while at College, he had studied chemistry, anatomy, and natural history, in addition to divinity, with the view of taking a diploma in medicine, as well as his preacher's licence. After an exceedingly active period employed in journalism and in science, he was appointed editor of the 'Bombay Times,' and set sail for India. Under his able management that newspaper has not only attained a first position among journals in India, but has acquired the character of an authority in Europe.

Side by side with the arduous duties bearing on the management of a newspaper in India, Dr. Buist carried on an immense amount of scientific and philanthropic labour. In July 1842, he was placed by Government in charge of the Astronomical, Magnetic, and Meteorological Observatory, Bombay. The appointment was unsalaried, but his duties were so successfully proceeded with, that in the course of three and a half years upwards of three hundred thousand observations had been made, corrected, recorded, and prepared for publication; and Government was pleased on six several occasions to express their approbation of his exertions. On the 4th November, 1845, Sir David Brewster, in moving the thanks of the St. Andrew's Philosophical Society to Dr. Buist, states, "That he had much occasion to correspond with the Observatories in all parts of Europe organized for like purposes with that of Bombay, and that nowhere in England, nowhere on the Continent, had he seen anything like so large an amount of work done as had been carried out by Dr. Buist." In addition to the astronomical department, Dr. Buist organized and introduced an extensive system of tidal and meteorological observations, from Cape Comorin to the Red Sea. Besides these labours immediately bearing upon the Observatory, Dr. Buist volunteered, while in charge of it, to give lectures on natural philosophy, chemistry, and natural history, to the young officers of the Indian navy.

In 1841, on the death of Dr. Heddle, Dr. Buist was appointed Honorary Secretary to the Bombay branch of the Geographical

Society, the 'Transactions' of which contain many valuable papers contributed by him. He originated the publication of ocean-current charts, and worked simultaneously with, though independently of, the well-known Lieutenant Maury, of the American navy, and in the same track of inquiry. He also drew up a valuable chart, showing the earthquake-wave in connexion with severe storms.

Nor are these his only labours; for in the introduction of the art of making and glazing pottery, in the establishment of the trade of printing, and, finally, in the foundation of the meritorious Polytechnic establishment of Bombay, where native workmen are educated, India has been benefited by Dr. Buist. On all occasions when he could benefit the public by the influence of his pen, or personal exertions, he was untiring in his energy, and unwearied in his large-hearted philanthropy; and when it is considered that his varied avocations were carried on independently of the duties appertaining to a newspaper, that in India it is impossible to find intelligent workmen to execute orders, so that detail in any new idea must be worked out by the designer, and that the climate is trying to body and mind, we may well wonder at the vast amount of work accomplished by this indefatigable and energetic man.

In 1859 Dr. Buist was appointed Superintendent of the Government Printing-press, Allahabad, a position in which he might have fairly hoped in a few years to realize a moderate competency, and thus, in some sort, replace the means he had with an over-sanguine and uncalculating philanthropy lavished on the improvement and increase of scientific knowledge, and the general welfare of his fellow men; when his active and useful career was abruptly cut short by an illness, the result of anxiety and over-exertion, which terminated fatally at Calcutta on the 1st October, 1860.

M. Pierre DAUSSY.—Amongst our foreign honorary members whose names death has lately removed from our list, no one has a stronger claim to the record of our esteem, and to the expression of our regret, than M. Pierre Daussy, a member of the Geographical Society of Paris, of which, like Laplace, Cuvier, and Humboldt, he had also been President.

He was born in Paris on the 8th of October, 1792. A hydrographer,—the son of a hydrographer,—he commenced his special studies at an early age, and continued the same pursuits with exemplary perseverance to the close of a long life. As a necessary consequence, he has left the proofs of what may be effected by combined ability and industry. Before he was twenty-one years of

age the Institute of France awarded to him Lalande's medal for his calculations of the elements of the orbits of two comets, and the determination of the perturbations of Vesta. His industry and executive mathematical skill gained him the patronage of Beaumonts Beaupré, and caused him to be appointed by the Government to conduct the trigonometrical survey of the coasts of France, when he still wanted three years of obtaining the rank of engineer of the third class. This service led him not merely to observe particular phenomena occurring in certain rivers, such as the Loire and the Garonne, but also the variations in the level of the sea, demonstrating their relation to variations of the barometer. This, his great discovery, was subsequently confirmed by our countryman Sir John Lubbock. Having become attached to the Bureau des Longitudes, and a contributor to the *Connaissance des Temps*, as well as a member of the *Société de Géographie*, he applied himself to the improvement of the tables containing the geographical positions of the principal places on the globe. The important and valuable memoirs which he continued to produce in quick succession are so numerous, that the mere detail of their titles would exceed the limits of this sketch. Those given to the Academy of Sciences, of which he was elected member—to the *Société de Géographie*—to the *Annales Maritimes*—to the *Annales Hydrographiques*—and to the *Société Météorologique*, of which he was the founder, amount to 54, besides a considerable number of charts. Whilst thus engaged for the public, he continued his astronomical observations, and kept up an active correspondence with foreign astronomers and geographers.

The distinguished intellectual and scientific attainments of our departed Associate were adorned and commended by their union with the most amiable qualities of the heart, and his intimate friend, M. de la Roquette, concludes an interesting notice of his life and labours with the remark that "he had many friends but not a single enemy."

The Chevalier DE ANGELIS, our corresponding member at Buenos Ayres, and recently deceased there at a very advanced age, was by birth a Neapolitan, and, like many others, exiled from his native land in consequence of his political opinions. In 1825 he accepted an offer of employment from the Government of Buenos Ayres, where he became well known for his political and other writings. Of his publications we may mention, as of especial interest to this Society, 'The Collection of Geographical and Historical Documents

and Memoirs relating to the Provinces of the Rio de la Plata and Paraguay,' printed at Buenos Ayres (1836-39), in six folio volumes, an analysis of which will be found in the sixth volume of our Journal, prepared for the Society by Sir Woodbine Parish. It comprises a selection of the most important papers on those subjects existing in the old Spanish archives of that viceroyalty, accompanied by copious explanatory and additional notices by the accomplished editor. In the latter years of his life M. de Angelis was invited to return to Naples, but, preferring to remain in South America, he was appointed Consul-General for his Sicilian Majesty in the provinces of the Rio de la Plata, a reward which he had fairly earned by his long and useful labours in those countries.

The Rev. John William DONALDSON, D.D., the second son of the late Stuart Donaldson, an eminent merchant in the city of London, was born in 1811, and entered Trinity College, Cambridge, in 1830. His distinguished talent soon attracted the attention of the authorities of the College, and was practically displayed in successful competition for the prize annually awarded for a Latin declamation. With this exercise, which, it may be incidentally remarked, received the warm commendation of the present Bishop of St. David's, Dr. Donaldson's long career of literary successes may be considered to have commenced. Shortly after his name appeared in all but the highest place among the competitors for classical honours; and again, after another short interval, among the Fellows of Trinity. He was soon chosen to take part in the tuition of the College, and, while thus engaged, found time to produce his first, and perhaps most famous, work, the 'New Cratylus,' which, now in its third edition, deservedly maintains its position as by far the most important contribution to the science of comparative philology that has appeared in this kingdom. About the same time he superintended the compilation of the 'Theatre of the Greeks,' which, after running through numerous editions, has now appeared freed from all extraneous additions, as the entire work of its former editor.

After a stay of a few years at Cambridge, Dr. Donaldson was appointed to the head-mastership of the public school at Bury St. Edmunds; and there, amidst calls on his time and energies which would have left to most men no power or opportunity to undertake anything beyond their professional duties, he was enabled to give to the world a series of educational works—a complete and valuable edition of Pindar; a fresh and idiomatic translation and

commentary on the *Antigone* of Sophocles; some useful works on the Hebrew language; and his now well-known treatise on the Latin language, entitled '*Varronianus*,' which stands as completely at the head of works on Latin as the '*New Cratylus*' does of works on Greek philology. Towards the close of his stay at Bury he published the remarkable volume entitled the '*Book of Jashar*,' which, however it may have provoked comment on other points, has justly been pointed to by all competent to form an opinion as a sample of an easy and felicitous Latinity which has not been equalled in the present century.

In 1855 Dr. Donaldson returned to Cambridge, and, after a brilliant course of lectures on Latin synonyms, which were attended by the best scholars of the place, he steadily devoted himself to the advancement of classical learning. One of his first works after his return was a treatise on Competitive Examinations in reference to Classical Scholarship, which showed such thorough good sense, and such just appreciation of the nature of these forms of examination, that it is only natural to observe that he was soon afterwards appointed one of the classical examiners of the University of London, and subsequently one of the examiners for the civil service. A work on controversial theology, entitled '*Christian Orthodoxy reconciled with the Conclusions of Modern Biblical Learning*,' appeared about the same time, and after but a short interval his completion of Ottfried Müller's famous '*Literature of Greece*'—a work which Dr. Donaldson had long been selected to finish, and which he now put forth in the three volumes that bear the united names of one of the greatest of the German and one of the greatest of the English scholars of our own times. He next addressed himself again more particularly to the study of language, and gave to the world successively a large and complete grammar of the Greek language, and one nearly as large and equally as complete of the Latin language, and the whole was to have found a fitting sequel in a large lexicon of the Greek language, with every improvement which the science of philology could have suggested or supplied. This last work he was only permitted to commence. Exhausted at length, not only by the labours above mentioned, but by every form of contribution to the many literary societies of which he was a prominent member, by the constant production of improved and enlarged editions of his numerous works, and by a general literary activity as ceaseless as it was successful, he sank, after a short but severe illness, borne

with the utmost patience and resignation; and has left to us a proof that in this country the scholarship of Bentley and Porson is still to be found in all its maturity and excellence.

Sir Charles FELLOWS was born in 1799, and at an early age showed himself to be endowed with the all-important qualities for the future traveller, of observation, quick perception, and artistic talent. Thus, at the age of fourteen, he illustrated by sketches, an excursion to the ruins of Newstead Abbey, then occupied by the youthful Byron, and these very sketches were engraved, twenty-five years afterwards, on the title page of the *Life of Byron*, published by John Murray. During the next six years he travelled through all parts of England, Wales, and Scotland. In 1820 he removed to London, where he at once entered into the best scientific and literary society of the day, joining many of the institutions; and he was amongst the earliest members of the British Association for the Advancement of Science. In 1827 he became a daring Swiss traveller; the first to traverse the Blumlis Alps at Kandersteg, and the discoverer of the modern route to the summit of Mont Blanc. He wrote an account of his ascent in an unpublished volume, elegantly illustrated with the first views which had ever been taken in that icy region. In 1832 he lost his mother, to whom he had been devotedly attached, and after this event his travels became more extended, spending during the next ten years the greatest part of each year in Italy, Greece, and the Levant. The use of his sketches is acknowledged with gratitude by Mr. Murray, who speaks of them as the chief source of the *Illustrations to Childe Harold*, engraved by Finden.

In 1838 Mr. Fellows started on an expedition into Asia Minor, his chief inducement in going there being his love of beautiful scenery, and his admiration of the simple character of its peasant class. He commenced by making short excursions around Smyrna, and eventually returned to that city, having ridden over more than 4000 miles of country then little known to Europeans. During five years from this time, Mr. Fellows made four separate tours in Asia Minor, chiefly to the provinces of Ancient Lycia, with which he has completely identified himself. His works upon the subject are, '*Asia Minor*,' 1839, '*Discoveries in Lycia*,' 1841, '*Xanthian Marbles*,' 1843, '*Ioni's Trophy Monument*,' 1848, and lastly a very ingenious and logical work, entitled, '*Coins of Ancient Lycia before the reign of Alexander, with an Essay on the relative dates of the Lycian monuments in the British Museum*,' 1855.

On the 7th May, 1845, Her Majesty conferred upon him the honour of Knighthood, "as an acknowledgment of the services rendered by Mr. Fellows in the removal of the Xanthian Antiquities to this country."

In the works of Sir Charles Fellows, above-mentioned, will be found the details of his archæological discoveries. In Lycia alone he examined the ruins of eleven cities never before visited. On his fourth and final expedition he had the management of a large party, consisting of more than a hundred men from Her Majesty's navy, besides stonemasons from Malta, men from Rome for taking casts, carpenters, interpreters, &c., an English artist and architect as companions and assistants. The portfolios of drawings, architectural measurements, and inscriptions, together with an account of the expeditions, as well as numerous specimens of natural history collected in Lycia, were presented by him to the British Museum in the spring of 1844.

Lionel GIBBORNE was born at St. Petersburg, in the year 1823. He was educated partly in that city, partly at Repton School in Derbyshire, and partly at Geneva. He thus acquired a familiarity with French, and several other European languages, which was of the greatest service to him in after life. At the age of sixteen he returned to England, and shortly after entered the engineering department of the University of Durham; after graduating there he proceeded to Ireland, where he remained for nine years, first in the service of the Shannon Commissioners, and afterwards in that of the Board of Public Works. During this long period he made himself thoroughly acquainted with several important branches of his profession. He was employed principally upon the works undertaken for the improvement of the navigation of the Shannon, and for the arterial drainage of the country. He was also engaged in the relief works which were set on foot during the Irish famine, and at one time had several thousand men at work under him. In all these employments, and especially in the last, he had many opportunities of displaying that promptitude and decision in emergency, and that power of influencing, attaching, and working with other men, for which he was so greatly distinguished in after life.

In the year 1853 Mr. Gisborne was requested to undertake an expedition to the Isthmus of Darien, for the purpose of ascertaining the possibility of uniting the Atlantic and Pacific Oceans by a ship-canal. Accompanied by his friend Mr. M. C. Forde, he unfortunately arrived
and was prevented by

the weather, and by illness, and also by the opposition of the natives, from completing this survey. The next year Mr. Gisborne again proceeded to the Isthmus, accompanied by several other engineers, and by some troops provided by the Government of New Grenada. Shortly before his arrival two unsuccessful attempts had been made to cross the Isthmus; one by Captain Prevost of the Royal Navy, the other by Lieutenant Strain of the United States Navy. Mr. Gisborne and his party accomplished this, and the whole intervening country was carefully surveyed. It was found that the height of the mountains, forming the axis of the Isthmus, was so great as to render the construction of a ship-canal impossible, except at an enormous cost.

In the year 1852 Mr. Gisborne first entertained the idea of a scheme for the embankment of the River Thames. In 1853 carefully considered plans were made out and submitted to the Government. Mr. Gisborne also published his views in a printed statement which was widely circulated. Ultimately a bill for carrying the scheme into effect was introduced into the House of Commons; it passed the second reading, but was withdrawn in consequence of the outbreak of the Russian war. It is not too much to assert that the various plans for the embankment of the Thames which have been produced—some one of which now seems likely to be carried into effect—were all, to a considerable extent, founded on that originated by Mr. Gisborne. Besides the undertakings already mentioned, Mr. Gisborne was employed in engineering works in various parts of the continent; in Sweden, Switzerland, Naples, Russia, and France. In 1855 he began to turn his attention seriously to the subject of submarine telegraphy. In that year he went to Constantinople, and obtained from the Turkish Government the concession for the Dardanelles and Alexandria telegraph; whilst in the latter part of the same year his brother, Mr. Francis Gisborne, succeeded in obtaining from the Porte the concession for the Red Sea and Indian Telegraph. In 1859 Mr. Gisborne proceeded to the Red Sea to superintend the submersion of that part of the cable which was to connect Suez with Aden. This was successfully performed in the spring of the year, and on its conclusion he embarked on board the Peninsular and Oriental Company's steamer *Alma* on his return to Suez. The history of the wreck of the *Alma* is well known. The crew and passengers remained for four days upon a coral-reef near the island of Little Horvish, exposed to the intense heat of the climate, and almost

without fresh water. Mr. Gisborne distinguished himself greatly in saving the women and children, and in superintending the arrangements made for their safety and convenience while upon the reef, and received from his fellow passengers an address expressive of their sense of the services which he had rendered them. This was his last voyage. He had for some years been suffering from an affection of the heart, which was greatly aggravated by the exertions he made and the sufferings he underwent in the Red Sea; his health rapidly gave way during the autumn and winter of 1860, and he died in London on the 8th of March, 1861.

Mr. Robert JAMIESON was an enlightened philanthropist, who had for many years devoted time and wealth in endeavours to civilize the native races of Africa.

In 1839 he built and fitted out, with much care and expense, the *Ethiops* steam-ship, appointing to her command the late Captain Beecroft, to whom he gave minute and ably-written instructions for his guidance in exploring and trading voyages. Narratives of her successful voyages were published by Mr. Jamieson, and others are given in the Journals of the Royal Geographical Society.

It will be recollected that it was Beecroft, in the *Ethiops*, who steamed to the rescue of H.M.S. *Albert*—one of the vessels of the Government Niger Expedition, famous for its misfortunes—and brought her down the river and saved a remnant of her crew from that fearful fever of which their comrades had perished. Against the project of this disastrous expedition Mr. Jamieson had earnestly protested in two published appeals. In 1859, Mr. Jamieson published a tract, entitled 'Commerce with Africa,' pointing out the benefits that might be obtained by establishing a short inland communication between Cross River and the Niger, to avoid the swamps of the Delta; but his advancing years and failing health precluded further active exertions.

Macgregor LAIRD was born in Greenock in 1808. After completing his education at Edinburgh, he entered into partnership with his father, the late Mr. William Laird, in an engineering establishment in Liverpool, which he shortly afterwards relinquished in consequence of the field for enterprise seemingly opened up in Central Africa by the important discovery of the Landers, tracing the course of the river Niger to the sea. He took an active part in forming the Company which, in 1832, despatched from Liverpool an expedition consisting of two steam-vessels,

under the command of Richard Lander, with whom Mr. Laird was associated in carrying out the enterprise. One of the steamers, the *Alburkah*, was designed and built by Mr. Laird, being the first iron vessel that performed a sea voyage. The result of this expedition is generally known from the interesting and spirited narrative published by him. It was attended with a melancholy loss of life: for, out of the 48 Europeans who started with it, nine only survived. The steamers reached the confluence of the rivers Niger and Chadda, whence, suffering severely from the effects of the climate, Mr. Laird penetrated as far as Fundah, having been carried on a litter the greater part of the way. He returned to Liverpool in 1834, with his health much impaired by the hardships he had undergone, from which his constitution never fully recovered; and to which may be attributed his untimely death, at the age of fifty-two.

Mr. Laird next turned his attention to Atlantic steam navigation, and formed a Company, in 1837, with that object. The *Sirius* was despatched by them in April, 1838, and accomplished the first steam voyage across the Atlantic. She was followed shortly afterwards by the *British Queen* and *President*, built by the same Company, each upwards of 2000 tons—a decided stride in advance at the time, though we have since seen that tonnage greatly exceeded.

Mr. Laird removed to Birkenhead in 1844, where for several years he took an active part in furtherance of the great works in that place which has since risen, and is still increasing, so rapidly in importance. On his return to London he devoted the last twelve years of his life exclusively to the development of the resources of Africa, more especially towards establishing that trade with the interior which he had perseveringly advocated as the best means of counteracting and finally extinguishing the slave-trade. Having obtained a contract from Government, he established the African Steam-Ship Company, which maintains a monthly communication with the various ports on the coast as far as Fernando Po. But Mr. Laird did not rest satisfied with the development of the coast-trade alone. He acted upon the idea of cutting off the slave-trade at its source by introducing into the interior habits of peaceful industry, and ultimately rendering the river Niger the highway of legitimate commerce. With these views he fitted out, in 1854, a trading and exploring expedition at his own expense and risk, but with Government support, which ascended the river Chadda in the steamer *Pleiad*, 150 miles beyond

the point previously reached. This voyage was distinguished by the gratifying and remarkable circumstance, that not a single death occurred during its progress—a result to be attributed mainly to the use of quinine as soon as the river was reached, as well as to the general excellence of the equipment and arrangements of the expedition.

Encouraged by this result, Mr. Laird prevailed on the Government to enter into contracts for annual voyages up the river, and for this purpose built the steamers *Dayspring*, *Sunbeam*, and *Rainbow*, which have made repeated ascents. The *Dayspring*, having reached Rabba, on the Niger, in safety, was lost in a rapid a few miles above that place; and the *Sunbeam* is now on the coast waiting the rising of the river for another ascent. Mr. Laird also established trading depôts at the confluence of the Niger and Chadda, and at various places lower down, which are still in active operation.

It is due to the memory of Mr. Laird to state that he persevered in these undertakings with little or no prospect of personal advantage, and that, while in early life he participated to some extent in African exploration, he also deserves credit for his steadfast endeavours to promote the geographical discoveries of others.

JOSEPH LOCKE, M.P.—Foremost among the engineers who followed in the footsteps of George Stephenson we find the names of Robert Stephenson, Brunel, and Locke; and it is singular that, having passed many years in amicable rivalry—Brunel advocating the extension of his broad-gauge lines and its vast works; Stephenson and Locke, on the other hand, giving preference to the narrow-gauge; and the latter insisting upon the necessity of economy in construction—they should all three have passed away at very nearly the same age, and within a short period of each other, leaving works which will bear testimony in future ages to the enterprise and public spirit of the times in which they flourished. Mr. Locke's numerous lines of railway in Great Britain and the Continent are characterised by economy of construction, owing to the introduction of steeper gradients than those which had usually been adopted. Well acquainted as he was with the powers of the locomotive-engine, he did not hesitate to impose upon it tasks which his predecessors had thought beyond its power. Thus the line from Lancaster to the north rises 1000 feet above the level of the sea, avoiding tunnels or the very heavy works which an adherence to easy gradients would have rendered necessary. The true monument of his eminent engineering is to be found in

those numerous districts which could never have supported the expense of railway communication under the old system, but have already realised its advantages under that of Mr. Locke.

General Sir Charles W. PASLEY, K.C.B., D.C.L., F.R.S., &c., was educated for the Royal Artillery, and in that branch of the army obtained his commission as second lieutenant in December, 1797, but he removed to the Royal Engineers the following year. He was present at the defence of Gaeta, the battle of Maida in 1806, and in 1807 at the siege of Copenhagen. Subsequently he took part in the retreat to and battle of Corunna, and again was chief-engineer to the Marquis of Huntley's division in the Walcheren Expedition. Since 1812 his services have been required in England. First he was appointed to the Plymouth division, then director of the Royal Engineer establishment at Chatham. It was when thus engaged that he undertook the task of blowing up the *Royal George*, at Spithead. His last appointment was Inspector-General of Railways in the Board of Trade. He was the inventor of some improvements in pontoon bridges, and author of a treatise on 'Military Instruction,' 'An Essay on the Military Policy and Institutions of the British Empire,' and other professional works.

During many of the last years of his life, this gallant veteran was a frequent attendant at the meetings of the various scientific societies of which he was a member, including the Royal, Royal Geographical, Geological, Astronomical, and Statistical Societies, and was an energetic supporter of our Anniversary Meetings.

Sir Geo. SIMPSON, when a youth, was received into the counting-house of a London firm, largely engaged in the West India trade. His active and energetic habits soon attracted the notice of the late Earl of Selkirk and of the late Mr. Andrew Colville, both of whom took prominent parts in the rivalry then carried on between the Hudson Bay and North-West Companies, in the former of which they were large stockholders. Through their influence Mr. George Simpson was selected to superintend the affairs of the Hudson Bay Company at their settlements in British North America, and he proceeded thither in February, 1820. A coalition of the rival Companies having taken place the following year, he was appointed resident Governor of Rupert Land, an office which he held till the day of his death, in last September. By his address and dexterity he softened, and ultimately removed, the enmity and rancour which rivalry had created between the officers and men of

panies, and by his own example taught men to work amicably together to promote the interests of the new association. His experience in the Indian country, his intimate knowledge of its resources, and his influence both with its white and Indian population, tended greatly to facilitate the progress through it of the land Arctic expeditions fitted out by the Government, and to lessen the hardships and privations they had to encounter.

The Arctic expeditions undertaken by the Hudson Bay Company were planned and fitted out under his immediate direction, and the instructions which he gave to their respective commanders, independently of their admirable adaptation to the ends in view, were eminently calculated to promote the objects for which they were issued. For these he received the honour of knighthood in the year 1841; and on the 3rd of March of that year he set out from London on his overland journey round the world, which he accomplished in 19 months and 26 days. Of this journey he published a narrative four years afterwards.

In conclusion we may remark that his suavity of manners, his patience, fortitude, and resolution amidst scenes of trial and difficulty, his unflinching and disinterested devotion to business, the amazing accuracy and extent of his knowledge of the affairs over which he presided, and the masterly readiness and precision with which he invariably applied it, rendered him eminently qualified for the situation he held during 40 years in the service of the Hudson Bay Company.

The late Mr. Matthew UZIELLI died, after a short illness, at Ostend, on 5th October, 1860. Although not a man of science, his memory deserves a passing tribute on this occasion, as having been one of those useful members of the Society whose fortune is ever ready to sustain and promote the cause of art and science. As an illustration of his liberal spirit, the Anniversary Address of 1856 of our President, the late Admiral Beechey, records the following:—

“I cannot quit the subject of this expedition without mentioning an instance of rare liberality in the cause of geographical science which was communicated at one of our evening meetings during this session by Count Strzelecki. When the North Australian Expedition was first planned, and when, owing to the length of time which had elapsed before it started, it was supposed that funds were wanting to carry it out, an associate of this Society, Mr. M. Uzielli, generously offered to place the munificent sum of 10,000*l.* at its disposal. Another of our associates ” ” ” S. Lindsay, M.P.,

had also previously offered to contribute largely towards the outfit of the expedition. As, however, the Government have taken the matter into their own hands, these gentlemen have not been called upon to fulfil their promises; but we must still look upon the offers as proofs that the labours of the Geographical Society are fully appreciated by practical men, and of the zeal that exists among us for the advancement of geographical knowledge."

But, independent of this offer, and his subscription of 10,000*l.* to the Guarantee Fund for the Exhibition of 1862, Mr. M. Uzielli was a constant promoter of philanthropic objects; and appeals in cases of general or individual distress were seldom made to him in vain.

John Ashley WARRE, M.P., was educated at Harrow and at Christ Church, Oxford, which he entered as a gentleman commoner. His political life extended over thirty years, having first represented Lostwithiel in 1812, and subsequently Taunton, Hastings, and Ripon. He was a steady, consistent Whig, of the old and most confirmed school, and advocated earnestly those great measures of Reform which at first caused so much uneasiness and alarm in the minds of many, but which are now acknowledged to be among the greatest blessings ever conferred on a nation.

That his services were duly appreciated may be inferred by his having been offered office more than once, but which, from an inherent sense of the value of freedom of action, he steadily declined. He knew how to be liberal in support of the principles to which he was attached without illiberality towards those from whom he widely differed; and for many years he enjoyed the friendship of many with whose political principles he had no sympathy.

His was no common mind: it was so well stored on every subject—the result of close study and deep thought—that it would have been difficult to find a topic for discussion on which he was not prepared to offer a ready remark.

His memory of past events generally, but more particularly of the navy, for which he entertained a perfect affection, was very remarkable. The glorious deeds of early naval history were accurately related in the most graphic manner, and he was equally well-informed on all the economy of modern improvements. Indeed he was a living naval chronicle.

In many of the scientific questions of the day, and especially with those advocated by this Society, he took an earnest interest, attaching himself to the gallant leaders in such matter

ing warmly into the discussion of their particular theories. Such were ever welcome guests at his hospitable abode, and never left it without feeling that he had not only "entertained" them, but had communicated information well worth their remembrance.

Equally simple and unostentatious in manner, few men were more respected. Where his heart prompted, his hand obeyed; and numbers blessed a generosity that did good far and wide, without pretension and without display.

He was earnest and devout, making religion the principle of life; and none ever heard from his lips a word that lacked charity to others.

ADMIRALTY SURVEYS.*

The Coast surveys in course of execution, under the orders of the Admiralty, both at home and abroad, have made fair progress during the past year. They are conducted by twenty different surveying parties, one-half of whom are employed on the coasts of the United Kingdom; the remainder in the colonies of Australia, Cape of Good Hope, West Indies, Nova Scotia, St. Lawrence, and Vancouver Island; also on the coast of Syria, in the Turkish Archipelago, in Banka Strait, China, and Japan.

England.—On the south coast, Commander Cox and Mr. Davis, R.N., carefully sounded the bar of Portsmouth harbour at the end of May, 1860, in order to ascertain the effect produced upon it by the dredging that had taken place during the past year. The soundings were made in sections, with intervals of only 8 yards between each cast of the lead, the lines of section were 17 yards apart, and the whole plotted on a scale of 60 inches to a mile. This operation has just been repeated by Messrs. Taylor and Reed, R.N., the soundings being accurately reduced to the same datum; and it is satisfactory to be enabled to state that a depth of nearly 6 feet has been gained over the greater part of the bar, and that a small amount of further dredging, so as to equalize the surface of the ground, will give a depth of 18 feet into the harbour at low water, or of 27 feet at high-water neaps, and 30 feet at high-water springs, thus greatly increasing the value of Portsmouth as a harbour. In the Channel Islands, Commander Sidney and Mr. Richards, R.N., have completed the survey of the east coast of Guernsey and of Sark, and sounded

* Captain Washington, R.N., F.R.S., Hydrographer to the Admiralty.

over an area of 50 square miles ; in the course of their examination it has been found that the depths over the great bank off Guernsey have materially decreased since the year 1821.

On the coast of Devon, Captain Stokes and Mr. Usborne, R.N., have completed 5 miles of open sea-coast to the eastward of the Mewstone, and about 21 miles of the shores of the Yealm River, and partially sounded over an area of 62 miles, including Bigbury Bay, and to a distance of 5 miles off shore ; while the plan of Plymouth Sound and Hamoaze, by Commander Cox, on the scale of 10 inches to a mile, has been published at the Admiralty. In the Scilly Isles, Captain Williams and Mr. Wells, R.N., have been occupied in making and computing the triangulation of the group, during which the positions of 518 stations on the islands and rocks have been fixed and plotted ready for delineating the high and low water features, on the scale of 6 inches to the mile, comprising altogether about 50 miles of coast-line. In the Bristol Channel, Commander Alldridge, with his assistants, Messrs. Hall, R.N., and William Quin, have been employed on the coast of Glamorganshire, during which 21 miles of open sea-coast have been surveyed, and an area of 88 square miles sounded over, in the course of which 18,600 casts of lead were made and recorded, and some small rocks and shoals discovered. A chart of the same coast, from Nash Point to New Passage, on the scale of 1 inch to a mile, and a plan of Swansea and Neath, on the scale of 3 inches, have been published by the Admiralty during the past year. On the coast of Lancashire, Mr. E. K. Calver, R.N., with his staff, Messrs. Inskip and Davison, have re-examined the estuary of the river Ribble, leading up to the town of Preston, with its approaches, and corrected the charts of that part of the coast.

Scotland.—In the river Clyde, the same officers, Mr. Calver and his assistants, have made a new survey from Greenock to Glasgow, showing the changes that have taken place during the last thirty years. The river was sounded in sections, in great detail, and laid down on a scale of 15 inches to a mile, so that the plan will form a standard for reference at any future period. It may serve as a specimen of the minuteness with which such works are done, to learn that in the course of this examination and that of the Ribble, 18,657 soundings were taken, and nearly all plotted.

In Argyleshire, Commander Bedford, with his assistants Commander Creyke, Mr. Bouchier, and latterly Mr. Ray, R.N., and Mr. Stafford, have been engaged on the survey of Loch Linnhe, leading

up to the south-west entrance of the Caledonian Canal, and of the outlying rocks Dubh-Artach. In the course of this survey they have examined 70 miles of coast, and sounded over an area of 100 square miles. The western portion of the Isle of Mull has been published, on the scale of an inch and a-half to a mile; the north-west coast, drawn on double that scale, together with a plan of Loch Cuan on the 6-inch scale, is engraving, in order to meet the wants of the trade now springing up between the islands of Mull and Coll.

In Inverness-shire, Mr. Jeffery, R.N., with his assistants Messrs. Donald Matheson and James Hannan, has mapped the coast between Arasaig and Smirserei Points, on the scale of 6 inches, and Lochs Moidart and Kinhay, on the scale of 9 inches to a mile. In the Hebrides, Captain Otter, in the *Porcupine*, with her tender the *Seagull*, Lieutenant Chimmo, aided by his staff, Lieutenants Dent and Hawes and Messrs. Stanley and Boulton, R.N., have been employed on the west coast of North Uist, between that island and St. Kilda, and on part of the Islet of Rum; in the course of which they have mapped 138 miles of coast-line, and sounded over an area of 575 square miles. In their trip to the rarely-visited island of St. Kilda, they found the population, which appears to be stationary at 78 persons, suffering from famine, due to a loss of their crops. On this being made known in Scotland, it was immediately met by a most liberal subscription, that not only sufficed to relieve their hunger, but to establish some more permanent benefits for the use of the poor islanders. In Harris, Commander Thomas, with his assistants Messrs. Morrison and Sharban, has surveyed the Sound of Taransay and the East Bays, on the scale of 6 inches. All the above data have been added to the general chart of the west coast of Scotland, and the detailed charts are in progress of engraving; Loch Tuadh and the isles and Loch Scridain, by Commander Bedford, are already published, on the scale of 3 inches.

Ireland.—On the east coast of Ireland, Mr. Hoskyn, with his assistants Lieutenant Aird and Mr. Yule, R.N., have been engaged on the upper part of Lough Strangford, and on the shores of County Down, from Ballyferris Point to Donaghadee. Off the south-west and south coasts, Commander Edye and Lieutenant Horner have sounded over an area of 1450 square miles, carrying their soundings to an average distance of 23 miles off shore, and to a depth of 100 fathoms; so that the navigator, if he will but pay attention to his lead, and compare the depths and quality of the bottom

with his chart, may safely approach that coast by night, or in a fog.

In the course of last year several new charts of Ireland have been published at the Admiralty. Among these are Loch Larne and the entrance of Loch Carlingford, on the scale of 7 inches, by Mr. Hoskyn and staff; the coast from Larne to the Foreland, the joint production of that officer and Captain Bedford; Lough Swilly and Mulroy, Horn Head to the Foreland, and the Foreland to Aran Island; Killibegs, Donegal, and Teelin Harbour, from the surveys of Captain Bedford, and his assistants Lieutenants Sidney, Horner, and Mr. Davis; Broadhaven, Blacksod, Tralee, and Brandon bays, by Commander Beechey and Lieutenant Edye, thus nearly completing the publication of the hydrography of the north and west coasts of Ireland.

Iceland.—The project for laying a North Atlantic submarine electric-telegraph cable from Scotland, by the Færøe Isles to Iceland, Greenland, and Labrador, so that no relay should exceed 600 miles in length, has led to the carrying a line of deep-sea soundings by that circuitous route, and a more direct return-line of soundings from Cape Farewell to Ireland. This expedition, equipped by the Admiralty in the most efficient manner, was placed under the command of Captain Sir Leopold McClintock, in H.M.S. *Bulldog*, assisted by Mr. W. H. Reed, R.N., Admiralty Surveyor, and Dr. Wallich, as Naturalist; at the same time Captain Allen Young, McClintock's companion in his memorable Arctic voyage, with Dr. Rae, Colonel Shaffner, U.S., and Mr. J. E. Davis, R.N., Admiralty Surveyor, were despatched by the enterprising Company in the *Fox* yacht, to examine the coasts and landing-places more in detail. The results, in a geographical point of view, which is our mere immediate concern at present, have been highly valuable. The depth of the ocean between Iceland and Greenland was found not to exceed 1570 fathoms, and the bottom to be fairly regular; from Greenland to Labrador, across the entrance of Davis Strait, a depth of 2030 fathoms was reached; and, in crossing the Atlantic on the return voyage, the greatest depth was found to be 1575 fathoms. At all these depths specimens of the bottom were brought up, and on one occasion a cluster of living star-fish was obtained from a depth of 1260 fathoms; a similar occurrence, proving the existence of living animals at that depth, took place in Sir James Ross's Arctic voyage in the year 1829, and in Commander Dayman's line of deep-sea soundings across the Atlantic in

1858. In order that the full benefit to science which may be derived from these specimens of the bottom should be rendered available, the Admiralty have retained the services of Dr. Wallich to examine them carefully, and prepare a full description of them, which it is understood will be published shortly.

In the course of the above voyage, in addition to the deep-sea soundings, the Admiralty surveyors, Mr. Reed, in the *Bulldog*, and Mr. Davis, in the *Fox*, took advantage of the opportunities afforded them, to make plans of several of the harbours touched at, as Haldervig and Thorshavn, in the Færøe Isles; with the Fiords of Beru, Hval, and Igalik, on the east and west coasts of Iceland, by Mr. Davis; Julianshaab and part of Godhaab on the west coast of Greenland, and Hamilton's Inlet, Labrador, by Mr. Reed: this latter inlet has assumed an entirely new form in our maps and charts from any that has before appeared. As physical geographers, we cannot but feel gratified that the requirements of submarine telegraphy conduce so much towards a better acquaintance with little known lands, and especially with the bed of the ocean of which we are still so ignorant, and with which, if submarine cables are to succeed, we believe we must be yet better acquainted. Nor can we withhold our tribute of gratitude to those gallant men who, under difficulties and privations of no ordinary character, boldly grappled with storms and ice in pursuit of the required information. Yet, though grateful, we need not be surprised. Were not both the commanders trained in the Arctic school? That school which has produced a Parry, a Franklin, the two Rosses, Scoresby, Beechey, Back, Richardson, Belcher, Bellot, Kane, Kellett, Collinson, Richards, McClure, McClintock, and others, men of all countries, to whom the Geographical Society delighteth to do honour. And I am satisfied that I do but express the general feeling of the members of this large Society in saying that wherever difficult work is to be done, in whatever part of the globe they may be found, whether with Kellett and Collinson in China, Richards in Vancouver, or McClintock in the enervating clime of the coast of Syria, where he now is, there the Arctic navigator will prove the value of the hardy school he has been trained in, and be fully entitled to share in the proud motto of *Nulli secundus*.

Mediterranean.—In the Turkish Archipelago, Captain Spratt, with his able assistant Lieutenant Wilkinson and Messrs. Stokes, Drew, and Millard, have completed the surveys of the islands of Astropalaia, Scarpantho, and Kasso, with several small harbours in

Crete, and Sailing Directions for that island, all of which, with the western half of Crete, are in a forward state for publication, the Turkish, Arabic, and Greek names of places having been carefully revised by Viscount Strangford and Mr. W. Spottiswoode. Captain Spratt has also recently carried some careful and valuable lines of soundings between Malta, Tripoli, Benghazi, and Alexandria, with a view to prepare the way for a submarine electric-telegraph cable, which it is hoped will shortly connect Malta with Egypt.

On the coast of Syria, Commander Mansell in H.M.S. *Firefly*, with his assistants Lieutenant Brooker and Messrs. Hull, Skead, and Gray, have completed the survey of the northern portion of the coast from Iskanderún to Markab, with plans of Ruad, Tripoli, Beirút, &c., all of which have been published. In connexion with this nautical survey some travellers took advantage of the presence of a surveying vessel on the coast, and made a journey to the more important spots in the interior, and determined several positions and barometrical heights. The party, consisting of Captain Washington, R.N., Commander Mansell, Dr. Joseph Hooker, F.R.S., the Rev. George Washington, M.A., Mr. Hanbury, and Mr. Gray, R.N., being provided with three chronometers, a theodolite, six barometers (corresponding observations being carried on night and day on board the *Firefly* on the coast), left Beirút in September last, by way of the Nahr el Kelb, Akturah, Afka, and Bisherreh, to the Cedars of Lebanon.

This remarkable group of trees, not exceeding three-quarters of a mile in circuit, stands on an elevated plateau, at the head of Wady Kadisha, and forms the centre of a semicircular basin or recess in the Lebanon, from 6 to 8 miles in diameter, at an elevation of 6400 feet. It is all but encircled by a wall of barren grey limestone mountains, rising some 3000 feet above the plain. The cedars stand alone, upon several small knolls (possibly a broken-up moraine deposited by former glaciers), and there is but one other tree in sight. The trees are about 400 in number, of all sizes; the largest is $40\frac{1}{2}$ feet in girth, but only a few of the old patriarchs remain; there are not more than eight trees above 20 feet in girth. It is understood that Dr. Hooker is of opinion that, judging from the number of concentric rings and other indications, there is no tree now existing more than 500 years of age, and none less than 30 years.

On leaving the Cedars two of the summits of Lebanon were ascended; the highest Dahar el Khádib, 5 miles to the north, was

found to be 10,400 feet above the sea, and afforded a magnificent prospect which was taken advantage of by Commander Mansell, who planted a theodolite on it and obtained a round of angles to Tripoli, Cape Madonna, and other points on the coast to the west, to Mount Casius very distant in the north, to Ba'albek, Hermon, Sunnín, and other points in the south, and to all the peaks of the Anti-Lebanon in the east and south-east, which were thus connected with the coast survey.

Proceeding onwards the party crossed the elevated plain of Coele-syria, or El Buka'a, where the water-shed, between the Orontes, flowing to the north-east, and the Leontes to the south-west, is near 4000 feet high, and reached Ba'albek or Heliopolis, with its marvellous ruins, at the western foot of the Anti-Lebanon range, and 3700 feet above the sea. Thence by Zebedani and round the southern end of Anti-Lebanon to Damascus. This city also lies in an elevated plain, but fully 1000 feet lower than Ba'albek, or about 2500 feet above the sea. Returning thence by Zaghleh and the admirable military road from Beirút to Damascus, now in the course of construction by the French, which will cross the Lebanon at a height exceeding 5000 feet, the party went to Beirút, Sidon, Tyre, Akkah, Hhaifa, Mount Carmel, and by Yafa to Jerusalem. Among other elevations measured in the City of David, the highest point of Mount Zion was found to be 2600 feet above the level of the Mediterranean, and the summit of the Mount of Olives, about 100 feet higher, while the lowest point of the Valley of Hinnom was 700 feet beneath. Jericho, Bethlehem, and the Dead Sea, were also visited, and the remarkable depression of the surface of this latter sea of 1300 feet below the level of the Mediterranean, which has been observed by former travellers, was fully verified.

It is right to add that Van de Velde's map of Palestine, by Petermann, based upon the trigometrical survey by our countryman, Lieutenant Symonds, R.E., in 1841, and combining the researches of Eli Smith and Dr. Robinson of the U. S., and other travellers, was found to be generally correct, and the best map of the country published. While Murray's 'Handbook,' here as elsewhere, proved to be invaluable; nor can travellers in these regions adequately express their thankfulness for the aid derived from this work: it is no exaggeration to say that it adds tenfold to the interest, the benefit, and the enjoyment of the tour. Probably, too, the present party was the first who had been enabled to refer on the spot to the 'Biblical Dictionary' edited by Dr. William Smith, and to test,

book in hand, the marvellous accuracy and research displayed by the several learned contributors to that work.

The barometrical heights, by Von Wildenbruck, were found to agree better with the observations of the expedition than the measurements of any other traveller. It may be worth notice that a complete meteorological register for 12 years, from 1848 to 1860, has been kept by the late Dr. McGowan at Jerusalem, and his barometer (one of Newman's) on being compared with a standard, was found to be in good order. The geographical information obtained during the above journey will, it is understood, be embodied in the Admiralty charts of the coasts of Syria and Palestine, now in course of publication.

Africa.—On the west coast of Africa six sheets of the Kawara or Niger, by Lieutenant Glover, R.N., on the scale of one inch, and a detailed plan of the port of Lagos, have been published during the past year. At the Cape Colony, Mr. Francis Skead, R.N., has completed a large plan of Table Bay, on the scale of 8 inches; he has also re-examined the lower part of the Kongone, one of the safest passages of the Zambesi. In the Red Sea, in the Strait of Jubal, Commander Mansell and Mr. Hull, in addition to their services on the coast of Syria, have re-examined the Ashraffi reef, and determined the site for a lighthouse, which it is hoped may be shortly built by the Egyptian Government, as it is much required in the narrow passage of that Strait.

Asia.—In the Persian Gulf, Commander Constable and Lieutenant Stiffe, of H.M. Indian Navy, have completed the gaps that were left in the survey of that gulf, revised the whole in position, and the charts are in the hands of the engraver, while Lieutenant Heathcote, I.N., has prepared a new chart of the Bay of Bengal, with a memoir, showing the currents that prevail in that sea during the southern monsoon.

The great pearl fisheries of the gulf of Persia are still in full activity, and as productive as of old. In the summer of 1859 there were employed no less than 2340 Arab boats, with crews of from eight to thirty men, in this branch of industry; the value of the pearls raised being estimated at 200,000*l*.

An admirable survey of part of the Shat el Arab, and of the city of Basrah, has been made by Lieutenant Collingwood, of Her Majesty's Indian Navy. Lieutenant Williams, I.N., in the surveying brig *Euphrates*, having finished the examination of a small portion that was wanting to complete the coast commonly called

the Malabar Coast, has gone to do some work on the coast of Ceylon. A survey of the rivers of the Panj'ab is in progress by Lieutenant Whish, I.N. Two surveying brigs, under Lieutenants Sweny and Jackson, I.N., are at work in the Bay of Bengal.

In Ceylon, Captain Pullen, in H.M.S. *Cyclops*, and Mr. G. F. Macdougall, R.N., have surveyed the dangerous rocks known as the Bassas, and examined the south-east coast of Ceylon, Galle Bay, and a part of the north-east coast of the island, all of which has been inserted in the Admiralty charts. On his passage to England Captain Pullen re-determined the position of the San Lazaro bank, in the Mozambique Strait, said to have only $3\frac{1}{2}$ fathoms over it; he also obtained several deep-sea casts of the lead, one of 2700 fathoms in the South Atlantic, one of 1800 fathoms on the Equator in longitude 20° w., and has swept away the vigia Devil Rock from its usual position in our charts, by dropping his lead on the site, and ascertaining that there is a depth of 2200 fathoms there, thus proving that no such danger can exist within a radius of 30 miles.

Two new charts of Banka and Gaspar straits, embodying all the surveys of Mr. Stanton, and his assistants, in H.M.S. *Saracen*, with the labours of the U.S. squadron, and of the Dutch surveying officers in Batavia, have been published at the Admiralty within the past year, and the Stanton Channel, along the coast of Banka, is now well known to every Eastern navigator.

China.—The requirements of the war, and the valuable assistance afforded by the Commander-in-Chief, Vice-Admiral Sir James Hope, have led to great activity in the surveying operations in China and the Korea during the past year. Commander Ward, in the *Acteon*, and Lieutenant Bullock, in the *Dove*, with their assistants Messrs. Kerr, Blackney, Farmer, Bedwell, Ellis, and Robinson, have surveyed Ta-lien-hwang Bay on the northern side of the strait of Pechili, where our fleet and army assembled preparatory to the late successful expedition which terminated in the capture of the Chinese capital, the restoration of peace, and the enlargement of commerce. Also the northern coast of the province of Shantung, with the anchorage off Chifu, the rendezvous of the French force, the Miau-tau group of islands, forming the strait of Pechili, and including the anchorage of Hope Sound, and, in fact, completing the shores of the gulfs of Pechili and Liau-Tung, from Staunton Island at the south-eastern extremity of Shang-Tung Promontory on the south, round to Ta-lien-hwang Bay on the north, embracing a coast-line of about

800 miles, hitherto but vaguely known, and very erroneous in position. On the eastern side of Liau-Tung Gulf occur Niū-chwang, one of the trading ports under the treaty, Hulu-Shan Bay and Port Adams, plans of which are in course of publication. In this latter portion the surveyors had the assistance of Commander Bythesea, v.c., and the officers of the *Cruizer* and *Slaney*, and it is gratifying to find that these young officers were ready to take an active and efficient part in the operations of the survey. When we look upon our maps and see the small space occupied by the gulf of Pechili, we are apt to form but a very inadequate idea of the extent of labour required to map its shores, but if it be recollected that in the course of this survey some 800 miles of the coast were examined and the positions of all important points fixed astronomically, those acquainted with the subject will be able to appreciate the material additions to our knowledge of the geography of China, which has thus been obtained, and which could not have been accomplished without the cordial co-operation of the Naval Commander-in-Chief on that station, to whom, as geographers, our thanks are heartily tendered.

Australia.—While inland discovery has been making rapid strides, the coast surveys in Australia have been rather in abeyance. Captain Denham, in H.M.S. *Herald*, after a prolonged stay of nine years on the station, has just arrived in England. On the passage through Torres Strait this officer was enabled to clear away some more of the reputed dangers of that passage, and to fix the position of certain shoals, a piece of good service rendered to navigation, as this route is fast becoming the highway between Sydney, Singapore, and China. And the Sailing Directions for this track, just completed by Commander Yule, will be a valuable boon to the mariner. In the new colony of Queensland, Mr. Smith, R.N., has recently examined Port Denison and the mouths of the Burdekin river, while a general chart of Tasmania, prepared under the superintendence of Mr. Fred. J. Evans, R.N., and including the portions surveyed by Mr. Douglas of Adelaide, and one of the southern portion of Australia, have been published by the Admiralty. A fresh impetus is, we trust, about to be given to the coast surveys of these colonies, as they have liberally offered to share the expense of an Admiralty survey, and five separate parties of surveyors have been organized for the purpose. Commander Cox, with a staff of assistants, Messrs. Bouchier and Boulton, R.N., and Mr. McHugh, have already broken ground at Melbourne, and are employed upon a detailed survey of Geelong

Harbour. Lieutenant Brooker and Mr. Guy, R.N., are about to proceed to Tasmania, and other parties will follow shortly, so that, if the Colonies will but continue their support, few years will elapse before their coasts and harbours will be completely examined.

British Columbia.—The surveying party under Captain George Richards, in H.M.S. *Plumper*, consisting of Messrs. Bull* and Pender, Lieutenant Mayne, and Messrs. Bedwell, Gowlland, and Browning, have, as usual, worked hard during the past season. They have surveyed Johnstone Strait, Jervis Inlet, and Home and Quatsimo sounds, in the course of which they have mapped 1100 miles of coast-line, and sounded thoroughly over an area of 350 miles, and partially over 50 square miles, chiefly between Vancouver Island and the mainland. Lieutenant (now Commander) Mayne also has explored the country between Jervis Inlet and Port Pemberton. The chart of Frazer River and Burrard Inlet, on the scale of one inch, and Nanaimo Harbour and Departure Bay, on the scale of 4 inches, by Captain Richards and his staff, have been published at the Admiralty during the past year. Also a new plan of the harbour of San Francisco, from the United States survey; and five sheets containing 15 plans of San Lorenzo, Santa Cruz, and other small ports on the west coast of South America, by Captain Kellett and Commander Wood.

Newfoundland.—There being no sufficient survey of the coast of Newfoundland, Captain Orlebar, with his assistants Commander Hancock, Messrs. Carey, Clifton, and Des Brisay, has been employed during the past season in examining the south coast of the island, in the course of which they mapped 190 miles of coast, including Burin and Placentia harbours, and sounded over an area of 2700 miles. The charts of the Upper St. Lawrence, from Montreal to Quebec, in 13 sheets, on the scale of 2 inches, and of the harbours of those two cities on the scale of 8 inches, have been published during the past year; and Liscomb, Marie-Joseph, Sheet, and Mushaboon harbours, in Nova Scotia, have also been published.

Bay of Fundy.—Captain Shortland, with his staff, Lieutenant Scott and Messrs. Pike, Scarnell, Mourilyan, and Archdeacon, has been chiefly employed at the upper end of the Bay of Fundy, and

* Captain Washington regrets to add that this was Mr. Bull's last work. On his return from a fortnight's absence in a boat sounding a bay, the fatigue and exposure proved too great for his constitution, and he died suddenly on the 13th November, 1860, and her Majesty's service was thus deprived of a good officer, a valuable surveyor, and an exemplary man.

in the Basin of Mines. In the course of the past season they have examined 60 miles of open coast and 100 miles of river and harbour shores, sounding over an area of 250 square miles. An useful Coasting-chart of these regions has recently been published by the Admiralty, extending from the eastern limits of the Bank of Newfoundland by Halifax to the Delaware. Some charts and plans taken from the admirable United States Coast-survey have also been published during the past year; as Long-Island Sound, leading up to New York, the Chesapeake as far as the survey has been made public, with Norfolk, Charleston, Savannah, and Pensacola harbours.

West Indies.—Mr. Parsons, and his assistants Messrs. W. B. Calver and Clifton, have completed a chart of the Grenadines, and are now at work in the Island of St. Vincent. An important correction in the position of some capes on the north-east coast of Cuba has been made by Commander Hamilton in H.M.S. *Hydra*, by order of Rear-Admiral Sir Alexander Milne, Commander-in-Chief on the West India station. Punta Lucrecia is shown to be in long. $75^{\circ} 40'$ w., instead of long. 76° w., as in many charts, and this correction of 20 miles of longitude gradually decreases east and west till it vanishes at Cape Maysi on the east, and Punta Maternillos on the west. The first volume of the 'West India Pilot,' comprising the coast of the mainland from the Orinoco, round by Yucatan and the Gulf of Mexico to Florida Strait, compiled by Captain Barnett, and revised and completed with a Table of Positions by Mr. James Penn, R.N., of the Hydrographic Office, has just been published at the Admiralty.

Variation.—Researches in the field of magnetism, in connexion with the security of navigation, are still engaging the attention of the Compass Department of the Admiralty. The causes of certain anomalies which existed in the compensation of some iron ships' compasses have been detected by an elaborate series of experiments undertaken by Mr. F. J. O. Evans, R.N., the superintendent, during the past year, and which have been ably investigated by the well-known mathematician, Mr. Archibald Smith of Lincoln's Inn. The combined results have been laid before the Royal Society, and will be doubtless published for the benefit of navigators of all nations. Terrestrial magnetism, in its relation to the progress of navigation, and thus indirectly to the advancement of geography, is a science deserving the cordial assistance of geographers, and we hope to see our travellers, especially when promoting their researches in the

remoter regions of the globe, devoting attention to the determination of its elements, in connexion with other objects of inquiry. Observations, chiefly for that primary element to the seaman and the traveller, the variation of the compass, are being made with much assiduity by the officers of the Navy. An elaborate series, by Captain Denham, has been brought up to the present time in *H.M.S. Herald*, from Australia, through the Indian Ocean, by the Cape of Good Hope to England; another series has just been made by Captain Pullen, in *H.M.S. Cyclops*, in the Red Sea, coast of Arabia, Indian Ocean, and Atlantic; and a third series off the west coast of Africa, between the Equator and the Cape of Good Hope, has been made under the auspices of Rear-Admiral Sir Frederick Grey, late Commander-in-Chief on that station.

Besides the surveys above enumerated, as in progress in different parts of the world, the labours of the Hydrographic Office, during the past year, have consisted in the publication, under the immediate superintendence of Mr. Michael Walker, Assistant-Hydrographer and chief Draughtsman, of about 90 new and corrected charts and plans, some of which have been already mentioned. It is with regret I add that increasing years have deprived the Admiralty of the valuable assistance of Mr. Walker, who, after 50 years of faithful public service, wisely retires into private life to spend the remainder of his days in peace and quietness. Those who can remember the state of our maps and charts half a century ago, will be best able to appreciate the labours of Mr. Walker. As Chief Draughtsman it was his duty to construct charts, often out of conflicting materials, and to reconcile longitudes which even some of our most skilful travellers and surveyors are too apt to leave in a state of uncertainty, as doubtless our excellent fellow-labourer, Mr. John Arrowsmith, would readily bear testimony. During the long period that Mr. Walker held this responsible post he had gained the entire confidence of Captain Hurd, Sir Edward Parry, Admiral W. H. Smyth, Sir Francis Beaufort, and the present Hydrographer, and served his country with a zeal, intelligence, and strict integrity, that cannot be too highly praised. And although he retires from official life, it is to be hoped that we shall long have the benefit of his counsel and co-operation as a Fellow of the Geographical Society, of which he was one of the earliest members.

ORDNANCE SURVEY.*

The progress of the Ordnance Survey in the north of England and in Scotland has been greatly retarded during the last year in consequence of the numerous detailed surveys in the south of England, which have had to be made for the purchase of land and for the laying out of the fortifications for the defence of the Royal arsenals, and upon which upwards of 400 surveyors and draftsmen, brought from the northern parts of the kingdom, have been employed.

The plans of Northumberland and Cumberland, on the $\frac{1}{25000}$ scale, are in course of publication, but, for the reason above stated, these counties will only be finished in about twelve months from the present time.

The plans of Perthshire and Forfarshire are also in course of publication, and the survey of these counties will also be finished about the same time.

England.—Yorkshire and Lancashire are published on the 6-inch scale, and Durham and Westmoreland on the $\frac{1}{25000}$ and 6-inch scales. The surveys made for military purposes at Portsmouth, Plymouth, Chatham, Sheerness, Dover, Pembroke, the environs of London, and several other places, have all been made and published on the same scales as those adopted for the National Survey, and as parts of the counties in which they are situated; should it therefore be decided by Government and Parliament to extend the Cadastral Survey to the south of England, these plans will form integral portions of the complete surveys of the several counties.


Scotland.—These counties have been published on the 6-inch scale:—Edinburgh, Fife, Kinross, Haddington, Kirkcudbright, Wigton, and Isle of Lewis; and the following on the 6-inch and $\frac{1}{25000}$ scales:—Linlithgow, Lanark, Ayr, Renfrew, Dumfries, Peebles, Selkirk, Roxburg, Berwick, Dumbarton, and Stirling; in fact, the Cadastral Survey of all the south of Scotland is finished.

In *Ireland* every county has been published on the 6-inch scale, and eight of the northern counties, which were not complete in all the details subsequently found necessary for the valuation and registration of property, have been revised and made complete.

The general map of the kingdom on the 1-inch scale has been retarded by the causes already stated, but the whole of *Ireland* has

* Colonel Sir Henry James, Superintendent of the Ordnance Survey.

been engraved in outline, and several sheets with the hill-features on them have also been published. In *Scotland* the progress of the 1-inch map proceeds *pari passu* with the survey for the larger scales, the plans being immediately reduced to the 1-inch scale and engraved. In *England*, the whole, with the exception of the five sheets which will include the portions not yet surveyed in Northumberland and Cumberland, have been engraved.

The great *trigonometrical operations* of the survey may be said to be closed, the "principal triangulation," the levelling taken in *England* and *Wales*, and in *Ireland*, have been published, and the levelling taken in *Scotland* is in the press, and in part printed, and will be published very shortly. The three volumes containing the levelling have indexes showing the lines which have been levelled throughout the kingdom, and along which marks  (a broad arrow with a horizontal line, to mark the exact point to which the levels are given) have been cut upon permanent objects, such as churches, bridges, &c., for reference. These volumes therefore contain very valuable information for all who are engaged in practical engineering operations, and for many other purposes.

The publication of the principal triangulation, with the figure, dimensions, and mean specific gravity of the earth derived therefrom, has been received in all parts of the world with the highest satisfaction. It has been described as an epoch-marking work in the higher branches of geodesy, and in *Russia* it has given rise to an interesting and valuable discussion between General Schubert and M. Otto von Struve, in communications to the Academy of Sciences at St. Petersburg, on the importance of making those corrections to the observed latitudes for the local attraction at the trigonometrical stations used in the measurement of arcs of meridian, which were first given in the principal triangulation of this country.

In the principal triangulation the figure and dimensions of the earth have been given as derived from our own measured arc of a meridian, and also as derived from the combined results of all the measured arcs in different parts of the world. In the estimates for the present year the sum of 1000*l.* has been taken to enable the Director of the Ordnance Survey to connect the triangulation of this country with that of *Belgium*, and with the triangulations of *Prussia* and *Russia* through that country. This will furnish the data for the measurement of an arc of parallel from *Valentia*, in the west of *Ireland*, to *Oursk*, on the river *Oural*, in *Russia*, of no less than 75 degrees in length, along the parallel of 52°.

This is the greatest geodetic operation that has ever yet been undertaken, or which could before have possibly been undertaken, and the result will put to a severe proof the determination of the figure and dimensions of the earth from the measured arcs of meridians.

From the Topographical Dépôt we have received the map of Montenegro, which has been recently made from the surveys of the Commissioners sent by our Government to mark the boundaries of that country, in conjunction with officers from the Government of Austria.

We have also received several lithographed sketches illustrative of the actions fought in China, and of the route followed by the allied armies in their advance upon Pekin.

The accuracy and perfection of the maps reduced by photography at the Ordnance Survey Office is well known to the public, and has been officially reported upon. The method of printing the reduced maps from zinc or stone, which the Superintendent of the Ordnance Office has named photozincography, has also been brought to great perfection, and promises to be of the greatest value for purposes not originally contemplated, viz., the printing of fac-simile copies of ancient MSS., an example of which has just been published in the copy of the part of Domesday Book relating to Cornwall.

A work on meteorology for observers, and especially for travellers, which should contain precise instructions as to the manner of reading and recording their observations, and with the necessary tables for their correction, has long been a desideratum, and this has now been supplied by the publication, by the Superintendent of the Ordnance Office, of a small work entitled 'Instructions for taking Meteorological Observations, &c.,' which has been adopted as the text-book for the Army Medical Department; all the officers belonging to which, wherever stationed, are now directed to make regular meteorological observations, and whose reports, when properly digested, will probably throw great light on this branch of science. A copy of this work will be found in the Library. The Superintendent has also presented the Society with a copy of his recently published 'Quadrant Atlas,' containing two maps of the world on his projection of two-thirds of the sphere, and on which the lines of equal magnetic declination are shown, and also four maps of the stars, two for the northern and two for the southern hemisphere, the central meridians being at six hours' intervals. These are circular maps, so folded as to form a quadrant, and are intended for the use of sailors and travellers.

GEOLOGICAL SURVEY OF BRITAIN.*

The connexion of the sciences of geology and geography is palpable, and there can be no doubt that every geographical surveyor will give a much truer character to his hills, escarpments, slopes, and valleys if he be well acquainted with their internal structure.

In the last Report presented to Parliament we learn from the explanation of the Director-General, Sir Roderick Murchison, that with the view of completing the classification of the older rocks of the British Isles, in which he had been assisted by Mr. Geikie, he was occupied during the last summer in more firmly establishing the views he had before propounded of the existence of a clear ascending series in the crystalline rocks of the Highlands, from vast basement-rocks of gneiss, which are of higher antiquity than any rock in England, Wales, or Ireland. The feature which renders this older or fundamental gneiss of singular interest to the physical geographer is that whilst the outline or external form of its chief masses, as seen in the Long Island and other parts of the Hebrides, are elongated geographically from N.E. to S.W.; the range of the strata is from N.W. to S.E., or transverse to the form of the land. A new sketch-map of Scotland, which is about to issue, as based on the original observations of Sir Roderick in the Highlands, and published in the Quarterly Journal of the Geological Society, has been prepared by Mr. Geikie, and in it will be shown for the first time that the upper portion of the crystalline rocks of the Highlands is the altered representative of the Lower Silurian rocks of the south of Scotland.

In the extension of the Geological Survey of England from the south to the north of England and Scotland, the insertion on the maps of the 6-inch scale of the subterranean knowledge obtained, is in no respect more interesting than in the correct delineation of the various altitudes to which the shore-deposits of antecedent periods have been carried up above the present sea-level. This is particularly conspicuous on all those sheets on which the contour lines have been laid down. It is out of place here to enter into details of the progress of this survey, so important in developing the mineral wealth of Britain; but it is gratifying to be able to state that the public are taking so much interest in the subject, that they now purchase threefold the number of geological maps which

* Sir Roderick Impey Murchison, Director-General of the Geological Survey of the United Kingdom.

they did two years ago. It would, indeed, be strange if such a result had not followed the labours of those who are continuously occupied in unfolding the mineral resources of their country.

Although Colonel (now Sir Henry) James, who so ably superintends the Topographical Survey, gave evidence 5 years since before a Committee of the House of Commons that in ten years the whole map of Scotland would be completed, it is, alas! now too probable that a very long period may elapse before North Britain will possess such a general geographical map as is already possessed by France and Germany. But this lamentable state of things is in nowise to be laid to the charge of the Map Office and its able superintendent, but is mainly due to the oscillation in the views of different Governments, and the sudden diminution this year of the Parliamentary grants (see also p. 179), coupled no doubt with an unwillingness to grant large sums for surveys on that stupendous scale, which, according to the mode adopted by the Map Office, were to serve as the basis for the construction of a *real map* on the 1-inch scale. It is for the latter or only manageable map that we, as geographers, have been calling out for thirty years, or ever since this Society was founded.

PROGRESS IN METEOROLOGY.*

Meteorology is not a science in which much progress can be made in so short a time as that which elapses between our Annual Reports. Nevertheless, since the last Anniversary Address from this chair, remarkable steps have been taken by Government tending to utilise this branch of knowledge in a general and important manner.

In 1857 it was arranged that simultaneous observations should be made daily at a large number of selected stations in the British Isles, in and around the Atlantic, and at places on the European continental coasts. By combining these observations in synchronous charts, and otherwise, it was seen that, irregular as changes of wind and weather seem to our usual apprehension, there is really so much uniformity and similarity of character in successive variations, that by means of a comparatively small number of observations, made daily at a few selected stations sufficiently far apart, and by the use of an "atmoscope" (or self-registering barometer) at a central station, to which meteorological telegrams may be sent from the other outlying stations; it was seen that

* Admiral FitzRoy, Director of the Meteorological Department, Board of Trade.

by such means a distinct intimation of marked changes of weather, and warning of dangerous storms, might be given at the centre, and thence to all other points of any telegraphic combination.

The idea of giving warnings of storms, by telegraph, was familiar to many meteorological observers—in America as well as in Europe. It was suggested before the year 1836, with a reference alone to the semaphoric telegraph, but directly electricity was made man's messenger, its applicability to this object occurred immediately. Yet the subject attracted too little popular interest to be taken up by any influential body until in September 1859, at Aberdeen, the British Association resolved to express to Government their view of its importance. The Prince Consort, then President of the British Association, directed steps to be taken. Communications were made to the Board of Trade. The Treasury and the Admiralty were consulted, and the result was the establishment of a system, experimentally, by means of which it is hoped that much loss of valuable property, and a much more serious loss of *invaluable* lives may be prevented. This system, known through the newspapers, was commenced last September. Until January it was limited to receiving reports from practising observers.

Memorandum on Storm Warning Signals.

A staff and two canvas shapes being provided, the following use will be made of them occasionally, perhaps once or twice in a month:—

One shape, that of a drum (or cylinder), has the appearance of a black square of three feet (seen from any point of view), when suspended.

The other shape, a cone three feet high, appears triangular (from any point of view), when suspended.

A cone with the point upwards shows that a gale is *probable* from the northward.

A cone with the point downwards shows that a gale is *probable* from the southward.

A drum, alone, shows that dangerous winds may be expected from nearly opposite quarters successively.

A cone and drum give warning of dangerous wind, its probable *first* direction being shown by the position of the cone; point up and above the drum for polar or northerly wind—down and below for southerly.

Whenever such a signal is shown (in consequence of a telegram from London), it will be kept up—shown distinctly—till dusk of *that day only*, unless otherwise instructed afterwards.

These cautionary or warning signals advert to winds during part of the next following two or three days; and, therefore, due *vigilance* should prevail from the *beginning* of such time until the weather is again finally settled.

No further steps are necessary for these objects at the telegraph-stations for the present. Other organization may follow when the coast-guard have prepared arrangements for repeating these signals along the coast to certain distances.

A conspicuous place should be selected for signalling, near the telegraph-station.

If conveniently practicable, the signal pole or staff should be in view of some seafaring persons and of the nearest coast-guard.

When both these objects cannot be conveniently attained without too great distance from the telegraph-station, one only—that of visibility to some of the seafaring community—should be secured.

In this case a message should be sent to the nearest coast-guard, and charged at the Company's tariff.

Further *local* notice will be given, it is hoped confidentially, by *local interests and authorities*. London can warn the outports. The coast-guard may repeat the warning as far as means allow, and *completion* of such cautionary notices may be effected by *private* assistance along the most frequented shores.

It should be remembered that only the greater and more *general* disturbances of the atmosphere are to be made known by this method (warning signals), not merely local or sudden changes (however violent or dangerous), which are not felt at a certain distance, and do not therefore affect other localities. Such changes are indicated to observers at these places by their own instruments, by signs of the weather, and by consideration of the weather reports for a few previous days.

Much inequality of atmospheric pressure or temperature, great depression or elevation of the barometer, sudden or rapid alternations, great falls of rain or snow, indicate more or less change, more or less wind, with its usual accompaniments, either in some places only or throughout an extensive area of hundreds of miles, if not thousands.

Speaking *generally*, there is far less occasion to give warning of *southerly* storms by signal than of *northerly*, because those from the southward are preceded by notable signs in the atmosphere, by a falling barometer, and by a temperature higher than usual at the season; whereas, on the contrary, dangerous storms from a polar quarter (N.W. to N.E.) are sometimes sudden and usually are preceded by a *rising* barometer, which often misleads uninformed persons, especially if accompanied by a temporary lull of perhaps a day or two, with an appearance of fine weather.

On the 6th of February the first warnings were given, on the foregoing principle, after which eight other warnings followed between that date and March 19th; since when, no general or remarkably windy atmospheric disturbance has occurred.

The warning of February 6th was disregarded at Shields by a fleet of vessels, and many were wrecked on the 8th or 9th.

Subsequently, whether from having appreciated these storm-signals, or from some other reasons, the *fact* is that very few, if any, wrecks occurred *on our* coasts during all the notoriously tempestuous weather of last February and March.

It is well known that M. Leverrier and numerous scientific authorities on the Continent, especially M. Buys Ballot in Holland, have for some time had their attention directed to simultaneous meteorological observations, and their utilisation for maritime, commercial, and geographical interests.

But the range of M. Buys Ballot's stations is small, and, on the other hand, that of M. Leverrier is so extensive that great difficulty has hitherto been found in grouping, combining, and concluding from them for practical use.

M. Leverrier's letter to his British colleague at Greenwich, in April 1860, arrived opportunely at the time our Government had under consideration these suggestions of the British Association (which originated at Aberdeen) and, undoubtedly, had the weight due to such an authority as himself.

The British Islands have very peculiar facilities for meteorolo-

gical communication by telegraph between outlying stations, on the sea-coast, and a central place—all at nearly the same level, and all similarly uninfluenced by mountain ranges, which are well known to alter or impede the horizontal movements of atmospheric currents. Great distinctions should be marked between those ever alternate, often conflicting *main* currents, tropical and polar, and the *local effects* of their union or antagonism—namely, mixed winds, whether westerly or easterly, with occasional cyclones or circulating eddies on a large or small scale.*

During the month of April this year, and to this time,† a polar current, very extensive and uniform, has swept or flowed *near* or along the surface of our islands and adjacent area, while its counter or *super* current has moved in a more or less contrary direction, usually above, but at times intermixing with, and often affecting or influencing the lower and normal "*abpolar*" movement by here and there pushing down and onwards. Considering that the lower current does not extend very far upwards (only a few thousand feet) and that high land mountains, and especially ranges of mountains alter or impede its progress, a variety of eddy winds, or, as it were, streams, with local and apparently anomalous effects, must be frequently caused.

Electrical action, condensation of vapour in hail, snow, rain or fog, or its other changes—namely, evaporation, rarefaction and expansion—absorbing heat and therefore causing cold, immediately affect currents of air in a degree proportional to their influence.

The polar current always *advances* direct from the northward toward the southward, or the south-westerly quarter, while *laterally* moving eastward (like a ship making leeway), pressed toward the east by the tropical flow which advances from the south-westward, usually above, and at an angle with the polar stream or current of air, often mixing with it but, at times, separately sweeping and warming the earth's surface, uncombined with the polar current, even while feeling its approaching influence, and, as it were, forcing a passage between streams of the chilling polar air, that at the same time are moving in opposite, and nearly parallel or slightly angular directions.

Sometimes their opposition is so equal, and equilibrium is so complete, that a calm is the result, and then there is no sensible movement horizontally along the earth's surface.

* See last Report, Royal Geog. Soc., 1860.

† 13th May, 1861.

The "atmoscope" is found to be an exceedingly useful instrument. It was invented by Admiral Milne, and, though considerably modified, as its use has suggested, in principle it is the same as his self-registering barometer. It shows the alterations in pressure, or the pulsations, so to speak, of atmosphere, on a large scale, by four hourly marks; and the diagram expresses, to a practised observer, what the indicator-card of a steam cylinder shows to a skilful engineer, or a stethoscope to a physician. It may trace its curve, hourly if required, by night and day, for a week or more.

For *travellers*, attention should be drawn to improved aneroids, some on more correct principles of construction, some much smaller than previous to the expiration of the French patent (taken out by their ingenious inventor, M. Vidi); others very suitable for measuring heights not exceeding about 4000 feet.

New constructions of mountain mercurial barometers have been lately suggested, but not proved yet by practical use. Perhaps it will be difficult to devise a better one than that of Gay Lussac, if made stronger, with the glassblower's work better executed, than has been the case with some that have been found too delicate for mountain ascents.

Travellers should not be influenced, in such cases, by the very precise refinement desirable in an instrument for the observatory (to which superlativeness many an opportunity of observation, with sufficient accuracy, has been sacrificed by accidents in travelling), but should endeavour to secure a reliable, though less minutely accurate means of ensuring results, within *known limits* of moderate error. A tenth of an inch alteration in the Torricellian column is caused by nearly 100 feet of change in elevation. What is this compared with some 20,000 feet, and the yet little known atmospheric influences at such a height, where the mercury falls to about 12 inches? And yet to attain a nicety of measurement, to the thousandth of an inch, instruments are offered to zealous travellers or voyagers, suitable only for use at convenient stations. This defect, if it may be so called (though really an excess of goodness in one direction), has been too general in marine barometers, also, of late years: excellently made, admirable in principle respecting accuracy and permanent reliability, but too finely graduated for an ordinary observer at sea, or by night, and too delicate in structure to bear the common shocks unavoidable in a ship of war. These objections have been lately obviated by a less minute graduation on a porcelain, instead of a metal scale (liable

to tarnish or rust), and by "packing" the glass-tube with vulcanised India-rubber. Thus constructed, the accuracy and reliability of a Kew model marine-barometer is obtained, to the nearest hundredth of an inch, having the quality of withstanding even heavy gunfire (as proved on board H.M.S. *Excellent*), and a facility for adapting spare portable tubes, boiled and fixed in their cisterns, capable of adjustment to any similar barometer, *without the aid of an optician*.

In using these invaluable instruments (which some voyagers would rather have than a chronometer, though one costs three pounds and the other about forty), it is well to have some definite idea of the amount of change which indicates unusually violent wind, such as the *St. Kilda* cyclone of October, 1860, the *Camilla* typhoon of the same time nearly, and the *Royal Charter* gale of October, 1859. In each of those very similar storms the barometer fell at the rate of a tenth of an inch an hour before the shift of wind occurred, before which it ceased falling, then began to rise, and while the violence of the tempest prevailed, rose as rapidly as it had previously fallen.

Generally speaking, and adverting to numerous other instances, sudden changes at the rate (nearly) of a tenth of an inch in one hour, are indicative of immediate and great atmospheric commotion. On the other hand, when the column does not rise or fall rapidly, that is to say, at an hourly rate of about the hundredth of an inch or less, any change of wind or weather of an extensive or general nature, however remarkable it may be, if the movement continue long, will be gradual and lasting.

RECENT GEOGRAPHICAL PUBLICATIONS IN EUROPE.*

Britain.—The Royal Atlas of Geography, which has now reached an advanced state, as published by Mr. A. Keith Johnstone is, as might be supposed from the accurate knowledge of the author, and his perspicuous method of applying it, a most desirable addition to our works. The clearness of the coast lines and river drainage, as defined in blue tints, is particularly to be commended. This Royal Atlas, of which eight Parts are already issued, is to be completed in ten Parts; and, in approving the execution of the maps, we cannot avoid calling special attention to the tabular and alphabetical lists of names of places, and the good arrangement by which the position of any place is at once found upon the map.

* Sir R. Murchison, Vice-President, R.G.S., &c.

In addition to his other maps, Mr. Keith Johnstone is about to publish a new Geological Sketch-Map of Scotland, by Sir Roderick Murchison and Mr. Geikie, which is alluded to in the account of the progress of the Geological Survey.

The Rev. H. Mackay, a minister of the Free Church of Scotland, and resident at Rhynie, in Aberdeenshire, who is a Fellow of our Society, has in the last year brought out a Geological Manual, which does him great credit. For, when we reflect on the difficulties under which a pastor who is most zealous in the performance of his clerical duties, in a remote and inland tract of Aberdeenshire, must labour, and who, in the employment of his leisure hours, has compiled this work, we must admire the ability and persevering research with which he has succeeded in imparting to his Manual so much freshness and originality. In no respect is this character more apparent than in the plan of arrangement by which the author commences his description of the physical geography of each tract by a sketch of its true basis or geological structure. The work is largely sold in Scotland, but has not been sufficiently spoken of in England. It is, indeed, a most useful school-book in opening out geographical knowledge.

Germany.—The country which gave birth to a Humboldt and a Ritter may well be proud of the efforts which are made to do honour to the memory of these illustrious geographers, by the establishment of foundations under their respective names, by which researches in distant lands are to be aided and encouraged. We trust that, with such an eminent African explorer as Dr. Barth, resident in Berlin, and with the knowledge we possess of his powers of writing on geographical subjects, the loss of Karl Ritter may be not inadequately supplied.

The well-deserved success of that admirable periodical, the 'Mittheilungen,' of Justus Perthes and Co., as edited by M. Petermann, is a satisfactory proof of the profound interest taken by our German contemporaries in every branch of geographical inquiry. Referring to that work for many valuable details, and most clear and accurate analyses of maps and volumes which are constantly issuing from the continental press, it is a satisfaction to us to see how through the pages of the 'Mittheilungen' the public in Germany are regularly and promptly made acquainted with all the most important of our British explorations.

Among the publications which are issuing from the press of Austria it is incumbent on us to notice with full approbation the

narrative of the Circumnavigation of the Globe, by the frigate *Novara*, in the years 1857-8-9. Commanded by Commodore von Wüllerstorff-Urbair, the description of the voyage has fortunately fallen to the lot of Dr. Karl Scherzer, one of the scientific members of the expedition, who has executed his task with great ability. Already an English edition of the first volume has appeared. The physical and geognostic suggestions which were written out by Humboldt for the guidance of the scientific inquiries of the voyagers, and which are prefixed to the narrative, are full of that love of nature which, to the last, animated the great and illustrious traveller.

In the volume which is to follow we shall doubtless have good descriptions of the natural history of the regions visited, for, as respects the geological structure of some of those tracts, Dr. Hochstetter has already published excellent detached notices.

The woodcuts, as executed at Vienna, and which are spread throughout the first volume, are of first-rate excellence.

*Russia.**—Russia has always claimed our special attention, and our Presidents have always considered it an important duty to place before the Society a sketch of the Researches of Russian Geographers during the past year, which, being published in a language very little known, are accessible to but few of our members.

The *Compte-Rendu* of the proceedings of the Imperial Society, during the year 1860, is indeed already before the public in the French language, and does great credit to the Secretary, M. de Thörner, who has prepared it. For, as the detailed descriptions of the countries examined are published in the Russian language, this *resumé* of the proceedings of our old allies is really most important. Established, as this Imperial Society was, on the same basis as our own body, the Secretary commences, as we do, their last year's Report with sketches of the lives of the recently deceased geographers of Russia. M. Savelieff, M. P. Kalmykoff, and General Tanner, are spoken of in terms of well-merited praise. The last of these is indeed one of those eminent practical geographers whose labours have been before enlarged upon by Sir R. Murchison, and whose measurement of the great Russian arc of the meridian, in conjunction with Struve, has rendered his name famous for all time among geographers.

The attention of Russian geographers has recently been much

* Thomas Michell, Esq., F.R.G.S.

divided between the country of the Amùr, definitively ceded to Russia by General Ignatief's treaty, and those regions of Central Asia which Russia has been so long engaged in exploring.

English geographers have already been informed that a scientific expedition was despatched to the Amùr, under the auspices of the Imperial Geographical Society. Mr. Schmidt, the chief of the geological section of that expedition, made some very important observations during a voyage from the new town of Blagovestchensk, at the mouth of the Zeya River to the port of Nicolaefsk, at the mouth of the Amùr. He denies the existence of volcanic rocks reported by other travellers, and found nothing but sedimentary deposits.

Early in June of last year Mr. Schmidt visited the island of Sahalin, held jointly by Russia and Japan, though virtually, and notwithstanding the treaty of Simoda (1855), in the sole possession of Russia. On landing Mr. Schmidt at once recognised the rocks of the banks of the Amùr as belonging to the carboniferous formation which prevails in the island, as well as in the basin of the Amùr. Mr. Schmidt has been authorised by the Imperial Geographical Society to devote the whole of this summer to the exploration of the island of Sahalin.

The expedition will return to St. Petersburg in the autumn of 1862, after passing the summer of that year in a minute exploration of the Amùr basin. Two assistants have been sent out to Mr. Schmidt; Mr. Plehn, who replaced Baron Maidel, and Mr. Brylkine, despatched by the Siberian Section of the Geographical Society; the latter being a gentleman well known as an explorer of the rivers Ussuri and Amùr.

Mr. Schwartz, the chief astronomer of the Mathematical Section of the Amùr expedition, is busily completing his calculations, and his assistant, Captain Rajkof, whose name already appears in our Transactions, has been thanked by the Council of the Imperial Geographical Society for the remarkable manner in which he has fulfilled the various duties with which he was entrusted.

The Imperial Geographical Society is now engaged in preparing a map of Eastern Siberia, including a portion of the Trans-Baikal country, the government of Irkutsk, and a part of that of Yeniseik, also in compiling an account of the labours of the Siberian expedition, and a work on the meteorological data now collected by the latter.

We cannot but appreciate the indefatigable exertions of the

geographers of Russia in throwing the light of science over such a vast country, and we should indeed be sorry if so much labour, so many hardships and privations, and so much money, were not requited by some of the material advantages at first expected, though as yet but little realized.

The geography of Central Asia has been enriched by several communications by Fellows of the Imperial Geographical Society of Russia, travellers in that interesting country.

Mr. L. Venuikof, one of the best modern authorities on the countries adjoining the south-eastern frontier of Russia, read a memoir in October last on the lake of Issyk-kul, from which he had just returned. After giving a short account of the topographical labours of his expedition on that lake and the Kashkar River, and pointing out the valuable additions thereby made to the works of Nifantief, Kiepert, Semenof, and Fakharof, Mr. Venuikof entered into some particulars respecting the lake Issyk-kul and its immediate neighbourhood. His attention was more particularly directed towards the south-west part of the lake, and the valley of the Kashkar, a portion of the country which had never yet been explored by scientific travellers. This gentleman has, to a great extent, dissipated the illusions hitherto entertained by some persons in Russia as to the great fertility of the country in the vicinity of the Ili River, and its adaptability to cultivation, and especially in reference to colonization. He also gave a very interesting description of the Kuté-Mandakh River, uniting the river Chu, which forms to some extent the boundary of Russia, with the lake of Issyk-kul. His researches at the source of the Chu afford much valuable information. The Kashkar rises in the Celestial or Tianchan Mountains, and flows through a natural pass in that chain, issuing from gorges which terminate in the valley of the Naryn and at the Alpine Lake of Son-kul, hitherto but vaguely known to geographers. Mr. Venuikof has further contributed some observations on the Sary-Baguiche tribe inhabiting that part of Central Asia.

Mr. Kuléwein, who accompanied General Ignatief in his late mission to Khiva and Bukhara, has given an account of his journey, which will be published in the Journal of the Geographical Society of Russia. He describes the Khanat of Khiva as it was under the administration of Seid-Mohammed-Khan (1856-1860), and traces the journey of the mission across the steppe of Orenburg, along the western shore of the Sea of Aral, as far as the lake of Aiboughir; the passage over that lake near the promontory of Urga, the arrival

of the mission at Kungrad on the Amu or Oxus, and a voyage of 18 days on that river, in native boats, as far as Khiva. Mr. Kuléwein proceeds to describe an audience of the Khan Seid-Mohammed, the administration of that chief, and the events which preceded his election, and to throw some light on the relations which then existed between Russia and that Khannat. Much valuable information has been obtained respecting the rising of the Turcomans, with whom Persia is now at war, the revolt of Kungrad, and the election of Mahommed-Fannah. As soon as Mr. Kulléwein's memoir appears in print many of us will, no doubt, eagerly apply to it for information regarding the limits of the Khannat of Khiva, its population, agriculture, and commerce, subjects which are extremely well treated by this able diplomatist. M. Kuléwein has presented to the Imperial Geographical Society photographic sketches of the country, and its native types, as well as of the coins in circulation in Khiva and Bukhara.

The explorations of a party sent by Dr. Bergstreusser to inquire into the practicability of uniting the Caspian with the Sea of Azof, and which were mentioned in the Address of last year, having resulted in a very favourable description of the country, and of the facilities which it afforded for colonization, the minister of the Crown domains of Russia despatched another expedition with the view of exploring scientifically the low valleys of the Kuma and Manych, and the Kalmuck steppe, which extends between the Don and the Volga. Instead of finding a navigable stream, the exploring party walked dry-shod along the so-called valley of the Manych from the Mojar salt-works, 60 miles from the Caspian to the very course of the Don. At the cost of great fatigue and many hardships this party ascertained that the Manych is nothing but a channel or bed eroded by the waters of spring, watered during a very short period of the year, and then left dry with a few intervening lakes or pools. Moreover the saline properties of the soil preclude all possibility of peopling these solitudes; and the absence of any population, added to the difficulty of collecting and retaining the spring waters in artificial reservoirs, are obstacles which can never be surmounted.

The geological researches of M. Barbet de Marny, a member of that expedition, have proved that the existence of the strait which united the Caspian with the Black and Azof seas, can only be referred to a period beyond the reach of history, and that its disappearance is to be attributed to that upheaval of the soil which pro-

duced the low country of the Manych, the country of the Cossacks, of the Black Sea, and raised up the steppe limestone of the Kuma and Volga, or country of the Don Cossacks. The examination of a canal would therefore necessitate the removal of those obstacles which the powerful hand of nature has placed between the two seas.

The officers of the Russian Surveying Expedition in the Caspian were enabled during the course of last summer to make a geodesical measurement of the peak of Demavend from two astronomical points, namely, from great Ashur Island, in Astrabad bay, a Russian naval station, and from the mouth of the Tedjen River, near Ferahabad, about 40 miles to the west of Ashur. The geographical position of those two points was determined astronomically, and by means of 17 chronometers used in the Caspian survey. The azimuths of the hill were determined at the two stations by one of Repsold's circles. The measurement from Ashur Island gave 18,551·0 Russian (or English) feet, above the level of the Caspian, and that from the point near Ferahabad 18,547·5; the mean altitude being 18,549·2 feet.

These measurements were apparently made with great care, and Captain Ivastchinzof, the chief of the expedition, is persuaded that, even under the most unfavourable circumstances, the altitude thus obtained must be quite within, at most, 130 feet of the truth.

It will be recollected that Mr. Thomson, Lord H. Schomburg Kerr, and Mr. St. Quentin, estimated the height of Demavend at 20,192 feet; and that Baron Minutoli and Dr. Burgsch, who, in July, 1860, likewise measured it by means of barometers, give figures almost similar, viz., 19,000 to 20,000 French feet.

The Surveying Expedition will probably have several other opportunities of measuring the height of Demavend. Captain Ivastchinzof expresses a wish that a similar measurement should be made from the Persian Gulf by means of stations, an undertaking which would decide the interesting question of a difference in level between the Caspian Sea and the Persian Gulf.

An article on the measurement of Demavend is contained in the 'Morskoi Sbornick,' or Naval Magazine, for the month of April, a work in the Russian language which is regularly received at the Hydrographic Department of the Admiralty.

While on the subject of mathematical geography attention must be directed to the proposal of Mr. K. Struve, Director of the Nicholas Observatory, at Pulkova, to effect a vast measurement of a meridional arc passing by the 52° of latitude, to extend from Valentia

in Ireland,* across the whole of Europe, to the fortress of Orsk, situated on the confines of the Government of Orenburg, and to embrace, therefore, 69 degrees of longitude. Last year Mr. Otto Struve was commissioned by the Russian Government to enter into communication on this subject with the Governments of Prussia, Belgium, France, and England; in each of which countries the project was most favourably received. Forty of the degrees of longitude to be embraced in this measurement belong to Russia, 12 to Prussia, 4 to Belgium, 2 to France, and 10 to Great Britain. It is also proposed to measure two other meridional arcs on the 47° of latitude as a means of checking the other operation: the first extending over 13 degrees in France, and the second over 20 degrees in Russia, from Kishenef to Astrakhan. Thanks to the careful triangulations already effected all over Europe, this gigantic work may be completed in the course of a few years. The necessary preparations are already being made in Russia and elsewhere.

Great as the activity of the Imperial Geographical Society of Russia would appear to have been, even from this imperfect sketch of its labours during the past year, a considerable portion of the attention of that industrious body has been devoted to statistics and political economy; branches of learning which belong to a distinct section of the Imperial Geographical Society. In the absence of a special Statistical Society at St. Petersburg, it is obvious that the labours of that section must be of immense advantage to Russia at a moment when the development of her vital resources is receiving the most serious attention of all classes, under the philanthropic inspiration and guidance of an enlightened Monarch.

Although not within the strict province of geography the very interesting labours of the Political Economy Committee of the Geographical Society of Russia must be noticed. This committee has held several meetings during the last winter, attended by some of the most enlightened men in Russia, including His Imperial Highness the Grand Duke Constantine, who, by taking an active part in the proceedings, has proved himself a real friend to the intellectual progress of his country.

This committee have had under consideration the causes of the financial difficulties of Russia, the recent stagnation in the trade of that country, the colonization of the Amùr and Central Asia, the emancipation of the serfs (as a "*fait accompli*"), and the subject of an international decimal system of measures, weights, and coins.

* See page 180 of this Address.

Lastly, it must be stated, that under the auspices of the Imperial Geographical Society of Russia, all those important resolutions were carried by powerful majorities of the committee in a truly liberal spirit, and in consonance with the doctrines of Adam Smith, J. Stuart Mill, and other economists, of whose principles England has so long been the practical exponent.

HINDUSTAN, SIAM, BURMAH, CHINA, AND JAPAN.*

On the subject of India Proper or Hindustan no communications have been made to the Society, but the name suggests a duty which has often fallen to former Presidents, of referring to the triumphant scientific career of Sir Andrew Scott Waugh, late Surveyor-General of India, now happily returned to his native country, after the active service of two-and thirty years. As the worthy successor of Lambton and Everest, Colonel Waugh brought to a conclusion the great achievement of the Trigonometrical Survey of India. The value of his services may be judged by the single fact, that in seventeen years' time he executed the triangulation of 316,000 square miles, an area nearly equal to the united areas of France and Spain, while he effected the topographical survey of 94,000 square miles, but little short of the surface of the British Islands. Colonel Waugh's operations were sometimes carried on at an elevation of 20,000 feet above the level of the sea, and sometimes over swamps almost on the sea-level; the air, from its rarity, difficult to breathe in the first case, and, from its deleterious quality, dangerous in the last. The combination of high qualities necessary to conquer these difficulties may readily be imagined, and they met in the person of the late Surveyor-General of India, now Sir Andrew Waugh.

Respecting Persia, the only contribution we have during the season, is the Narrative of a Journey across the Eastern Frontier of that country to Afghanistan, by Captain Claude Clarke. The journey extended from Meshed to Herat, a country seldom visited by Europeans. It embraces a portion of the great Salt Desert of Khorassan, a tract of small fertility and greatly infested by predatory hordes of Turcomans.

On the subject of the little known but vast region which lies between India and China, we have had several interesting and instructive communications. Captain Sprye and Dr. McCosh furnished to the Society elaborate Papers respecting the countries

* John Craufurd, Esq., F.R.S.

which lie between the British frontiers, respectively, of Bengal and Pegu and the Western confines of China, suggesting routes for the establishment in this direction of a commercial intercourse with the Chinese empire. It is only necessary to say that the subject gave rise to a lively and interesting discussion at the meeting at which the Papers were read.

On the kingdom of Siam we have had two valuable communications, both from Sir Robert Schomburgk, her Majesty's consul. These are narratives of his own journeys over parts of the kingdom seldom if ever visited by intelligent Europeans. Siam, after being for a century and a half almost as much excluded from European intercourse as Japan itself, has of late years, chiefly owing to the enlightened character of its present sovereign and the large commerce which has resulted from it, become an object of interest and importance to all the European nations, and more especially to ourselves.

The great Asiatic Archipelago, including the Malay and Philippine Islands, has been brought under the notice of the Society by two original and valuable Papers, describing portions of them hitherto little or very imperfectly known. One of these, by Mr. Spencer St. John, her Majesty's Consul-General in Borneo, gives an elaborate account of the physical and political geography of the north-eastern portion of the great island of Borneo. The other is by the eminent naturalist, Mr. Alfred B. Wallace, and gives by far the completest account hitherto rendered of the trade of New Guinea and the adjacent islands inhabited by the Papuas or Oriental Negroes. The importance of the Great Archipelago in question may be judged by the facts, that its population is computed at not less than twenty-five millions, while its external commerce, as conducted by the Dutch Spaniards and ourselves, is of the yearly value of thirty-six millions sterling.

Several interesting contributions to our knowledge of the vast empire of China have been made during the season. Thus, we have had an account of the survey of the Si-kiang, or Western River, by Lieutenant Lindsay Brine, R.N., while her Majesty's Ministers have supplied us with the Admiralty directions for the navigation of the rivers Si-kiang, Yang-tse-kiang, and Pei-ho, with that of the gulf of Pechili. It may here be mentioned that, for the prosecution of geographical knowledge, two expeditions are at present in progress; the one from the British territory in India into Chinese Tartary, and the other into the north and western

provinces of China, passing from the eastern side of China by the Great River into the provinces in question, and from them into Tibet, ending with the neighbouring British Indian territory.

It would be superfluous in this place to expatiate on the importance of China to our own well-being, but a few facts may be noted, which are both striking and illustrative. The joint amount of our own trade, export and import, amounts to 14,000,000*l.* a-year, exclusive of the trade with our Indian possessions. This trade is furnishing us with 76 millions of pounds yearly of a commodity—tea—which no other country can supply, and without which we could not, from long habit, live comfortably. Through that commodity, from five to six millions sterling are placed in the public treasury. China pays a yearly tribute to India of not less than five millions, without which our Indian dominions could not be conveniently held. And, finally, it contributes one half of the raw material of one of our great manufactures, silk, which is even more than Australia does for the woollen manufacture, great as is its assistance.

The empire of Japan, with its singular population, equal at least in number to that of our own island, and, among Asiatic nations, second only to China in civilization, is now fairly open to us, after an almost total isolation of two centuries; the unquestionable work of steam navigation. On this interesting and important country we have valuable and original communications. One of these is by our able and experienced minister, Mr. Rutherford Alcock, describing a journey into the interior of the main island, Nippon, and another to the Sacred Mountain Fusiyama, which may be called the Olympus of the Greeks or the Meru of the Hindus. The second communication is by Mr. Pemberton Hodson, her Majesty's consul at Hakodadi, the chief town and port of the Island of Yesso, a conquest of the Japanese made within the last three centuries, and whose native population, its Japanese inhabitants being but colonists, consist of a distinct and peculiar race. It is satisfactory to think that already the trade of Japan holds out good promise, for we find that in the course of last year we received from it no less than 7000 bales of raw silk, being three times the quantity which China furnished forty years ago, the quality being equal to the best Indian.

ARCTIC REGIONS.*

There are at present two expeditions occupied in attempts to reach the Pole. One, under Dr. Hayes, sailed from Boston on July 10th, 1860, in a vessel of 140 tons, called the *United States*, and arrived at Upernavik on August 12th. Here he obtained dogs and furs, and an interpreter named Mr. Peter Johnson. The last accounts from him are dated Tessinsak, August 23rd: he hopes to reach Cape Frazer, in lat. $79^{\circ} 42'$, on the east side of Peabody Bay, where he intends to establish his winter-quarters, and then pursue his explorations northerly along the shore of Grinnell Land.

The second expedition, under Dr. Forell, with several volunteers of education, assembled in April at Tromsø where they would be joined by Petersen, who carries up with him 20 cases of pemmican remaining from the store of that article supplied by our Government to the *Fox*. They then proceed to Spitzbergen, where they will winter, and follow Parry's route to the northward. These two expeditions will, in all probability, settle the question of an open sea in the vicinity of the Pole, and afford meteorological and tidal observations of great importance in high latitudes.

Renewed search for the *Erebus* and *Terror*.—Mr. Hall, a native of Cincinnati, has started in a whaler called the *George Henry*, on board which vessel he intends to winter in Cumberland Inlet, and in the spring to start in a boat manned by Esquimaux, following up the east coast of Fox Channel to the Strait of the Hecla and Fury, and so round the bottom of Prince Regent Inlet. The latest account from him is dated from his winter-quarters in lat. $62^{\circ} 51'$ and long. $65^{\circ} 5'$, when he claims to have discovered that Frobisher's Strait is an inlet.

Captain Parker Snow is fitting out a small schooner, the *Intrepid*, of 45 tons, in which he hopes to get away in June, and, following up McClintock's track, endeavour to push through Bellot Strait and reach King William Land.

The operations connected with the proposed route for the North Atlantic telegraph has appeared in the Proceedings of the Society; and a translation of a Paper on the currents and ice-drifts on the coast of Iceland has been forwarded by its author, our Corresponding Member, Captain Irminger, of the Royal Danish Navy, which

* Captain Richard Collinson, C.B., R.N.

will also find a place in our Proceedings, as it contains a succinct account of the ice-drifts round the shores of that island from the thirteenth century.

Sir John Richardson's account of the Polar Regions, reprinted from the *Encyclopædia Metropolitana*, has become so popular that there is perhaps no occasion to call the attention of the Members of this Society to it, unless it be to pay a just tribute to the author for the comprehensive view he has given of those portions of the globe which have of late years been the scene of so much exploration.

BRITISH NORTH AMERICA.*

The map of the country from Lake Superior to the Pacific coast, at Vancouver Island, which has been recently published in our Proceedings, to illustrate the various reports of PALLISER'S EXPEDITION, gives a clear view of the great additions which have been made within the last few years to our previously scanty knowledge of the geography of this region.

It is now placed beyond doubt that, within the British possessions, there are extensive areas, with good and varied soil, adapted for agricultural colonization, but at the same time subject to all the defects as well as the advantages of a temperate continental climate.

Within the territories of the United States, the Eastern Prairies, which have been so justly celebrated for their wonderful fertility, are succeeded to the west by a more or less arid desert, occupying a region on both sides of the Rocky Mountains, and interposing a barrier to the continuous growth of settlements between the valley of the Mississippi and the rich states of the Pacific coast. It is not therefore probable that, under such conditions, any line of route for heavy or rapid transport will be remunerative, while, in the present disturbed state of America, its construction may be indefinitely delayed. It is thus highly satisfactory for us to know that this central arid tract extends but a short way to the north of the boundary-line; and even there derives its character rather from the nature of the soil than from any climatic conditions. Further, along its northern border, there lies between it and the sub-Arctic forests a belt of land, from which the woods have been cleared by the agency of successive fires, the first and most arduous labour of removing the timber being thus spared to the future settler. This

* Dr. Hector, F.R.G.S.

"fertile belt," the first recognition of which most important feature is due to Palliser's Expedition, stretches from the southern end of Lake Winnipeg in a north-western direction continuously to the base of the Rocky Mountains, and affords throughout land which may be profitably cultivated; so that settlement within our territories will not meet with the same obstacle to its westward progress that it meets within the United States.

In this region the winter, though severe, is not more so than that experienced in Canada; and, in the western districts of the Upper Saskatchewan, the spring commences nearly a month earlier than on the shores of Lake Superior, six degrees farther to the south. On the other hand, in summer, owing to its higher latitude and altitude above the sea, the sun is less powerful; so that many crops which are readily raised in Canada will not meet with equal success here. All the ordinary cereals and green-crops have, however, been grown successfully, though severe frosts at night are occasionally experienced even late in the season. The depth of the snow is never excessive; while the pasture is so rich and abundant that cattle and horses may be left to obtain their own food throughout the greater part of the winter; and, with proper care and attention, there is no doubt that even sheep might be safely reared. It is only during the month of March, when the snow acquires a glassy crust, from the heat of the midday sun succeeded by hard frost at night, that stock would require to be fed.

While thus in some respects this country may bear comparison with Canada, we must not forget the total want of all the finer kinds of timber, which are such a valuable source of wealth to that province. To the settler deficient in capital, but content with the easy life and moderate gains of simple agricultural occupations, the Saskatchewan country offers a most desirable field; and it is only the difficulty of access to it that, for the present at all events, prevents its immediate occupation.

But upon this point we are no longer without abundant and accurate information. The route hitherto used by the Fur Company, which enters the country by Hudson's Bay, is so inferior that it has within the last few years been almost abandoned by them; that which they have now adopted, and which physically forms the natural entrance into the country, is through the American territory, from the valley of the Mississippi to that of the Red River of the north. A large portion of the fertile prairies of the latter valley lie to the south of the boundary-line, and will be "settled up" by

American citizens, and traversed by a line of railway; so that, whatever other route may be likewise opened, this will remain permanent, and will in all probability be preferred to any other by the emigrant. The only other route which, for political reasons would doubtless be the most desirable, is that which would connect the Red River settlements directly with Canada, without leaving British territory, by following the canoe-route from the shores of Lake Superior, in a north-west direction, by Rainy Lake and the Lake of the Woods. The united testimony, however, of the many exploring parties which have traversed this region shows that the construction of any such line of communication would be almost impracticable from its expense. This has been rendered only the more apparent by the minute survey of that district by the recent Canadian Expedition, the report of which, although excusably partial, affords small hope of obtaining any means of transport sufficiently inexpensive to be useful to the emigrant, by which stock could be conveyed into the country, or produce find its way thence to the Canadian marts.

There is no doubt that if the country of the Prairies were once inhabited by a large and producing population, this object could be obtained by a line of railway which would connect it directly with Canada; but at present such a line could only be made as part of a great national enterprise, with much wider aims in view than the mere extension of the Canadian settlements westward; as, for instance, the connection of the Canadian provinces with our new colonies on the Pacific coast. From Red River westward such a line, by following the "fertile belt," would pass through country that can be easily settled. The Rocky Mountains themselves, we now know, may be much more easily traversed than was formerly supposed, as they only present a narrow strip between 50 and 60 miles broad, beyond which commence the auriferous valleys of British Columbia. In reaching the Pacific coast from the Rocky Mountains, the difficulties to be overcome by the engineer are far more serious than any to be encountered along the eastern slope; but the mineral wealth of the country, necessitating the construction of roads, affords more inducement to the laying out of money on this than in any other part of the route.

The search for superficial gold ensures the active though temporary settlement of this country; while its buried, but more lasting, mineral products will retain a considerable permanent population, and give that solidity to the wealth of the country which alone

would warrant the construction of such a line of railway through a difficult and otherwise unproductive country.

The advantage of Vancouver Island as the western terminus for such a magnificent work, possessing as it does perfect natural harbours, and abundance of coal of good quality, are already well known to us all. Next year, however, we shall have an opportunity of becoming better acquainted with the resources of our new colonies, as, by advices just received, we learn that the colonists are energetically engaged in preparing a collection of samples of their mineral and other products for the Exhibition of 1862.

In connection with this subject, I may remind the Members, that on the islands of Japan and Formosa there exist extensive deposits of coal, which would thus form valuable stations between the north-west coast of America and our Indian dependencies and China—a natural fitness not to be overlooked in a scheme for communication with these countries by the Canadas, Saskatchewan, and British Columbia.

SOUTH AMERICA.*

We have received from Dr. V. Martin de Moussy the first two volumes of his work entitled '*Description Géographique et Statistique de la Confédération Argentine*,' recently published at Paris,—the result of four years' travels through the fourteen provinces of the Rio de la Plata for the express purpose of collecting for the Government of that republic, and with their aid, details relative to the physical geography and statistics of their population, agricultural, industrial and commercial capabilities, their geology, mineralogy, and natural history; in fact, to use the author's own words, he has had to form a general encyclopædia of the great basin of the Rio de la Plata, for which a residence of 12 years previously in the neighbouring state of the Uruguay seems to have well qualified him. We shall look with interest for the conclusion of this work, and especially for the atlas which is to accompany it; and in the mean time recommend Dr. de Moussy's book to all persons desirous of the most minute and detailed information regarding the countries of which he treats, and which seem only to require the aid of European emigration on a large scale to develop their vast natural resources, and to make them the most important of all the Spanish American states in South America.

* Sir Woodbine Parish, F.R.G.S.

On *Paraguay* another French writer, M. Demersay, has presented to the Society the first volume of a work he is now publishing, entitled 'Histoire Physique, Economique, et Politique, du Paraguay, et des Etablissements des Jesuites' (Paris, 1860).

The author was sent to South America in 1844 to collect information relative to the least known parts of the interior of Brazil and Paraguay, of which this work professes to give the results. The present volume is divided into chapters upon the political boundaries, the orography, hydrography, and climate of Paraguay, its fauna and zoology, and, lastly, on the ethnological characters of its inhabitants.

At the outset of his travels in South America M. Demersay had the good fortune to find M. Bonpland, the venerable companion of Humboldt, still living at San Borja, who received him with the greatest kindness, and gave him access to the journals and diaries of his own travels and researches during the thirty years previous.

In alluding to M. Bonpland, M. Demersay supplies some information, which will, I am sure, be of interest to the members of this Society, regarding the fate of his papers and collections of natural history. He has no hesitation in stating that M. Bonpland had no work prepared or preparing for publication, although he left a voluminous collection of notes upon his travels in South America, including extensive geological and botanical observations on Paraguay, the Rio Grande du Sud, the province of Corrientes, and the Missions, in which he so long resided. Two chests full of these MSS. it appears have been forwarded to France, and are now claimed by his heirs.

With regard to his collections of minerals and natural history, M. Bonpland had made a special bequest of them to the Museum at Corrientes, which he had himself founded. The Government of Corrientes, however, have offered to give them up to that of France in exchange for books and instruments, which they are more in need of; and, as this offer has been accepted, they will probably be sent to Paris, where they will be most prized and rendered available for the sciences to which they pertain.

AUSTRALIA.*

Since the last anniversary the march of discovery in the hitherto unexplored portions of this vast mass of land has been most

* Sir R. Murchison, Vice-President, R.C.S., &c.

remarkable. In the adjudication of one of our Royal Medals to Mr. MacDouall Stuart, allusion has been already made to the value of travels, which, though undertaken under discouraging prognostics, were carried out with such perseverance and ability as to have thrown a new light on the condition and capabilities of large tracts of the interior.

The public must not, however, be led away by the success of this adventurous and successful traveller to adopt the belief that there are vast internal tracts of great *continuous extension* where colonists can settle. The data ascertained by Stuart amount simply to this—that, at considerable distances from each other, there exist *oases*, refreshed by springs, in and around which good pasturage for sheep and cattle are to be obtained. On the other hand, these oases are separated from each other by broad tracts of bushy scrub, often saline, most difficultly permeable, and in which no trace of springs has been detected. Such intercalated waterless tracts present, therefore, considerable but by no means insuperable obstacles: for, if Stuart could traverse and retrace them with his appliances, how much less will be the difficulty when the scattered and well-watered oases become so many centres of occupation by the location of herdsmen and the erection of rural habitations, such, for example, as Messrs. Chambers and Finke, the spirited employers of MacDouall Stuart, propose to establish.

So soon, indeed, as interest points out the road, most surely then will our adventurous colonists push their flocks northwards, and thus render South Australia mistress of many a tract in the interior.

This once accomplished, and the shores in the vicinity of Cambridge Gulf reached (which Stuart is now endeavouring to effect), we shall then have in our hands the means of establishing a ready line of telegraphic communication across the great continent from the south to the north, to which attention has been specially called by Sir Richard Macdonnell, and by which we may place our Australian colonies in direct communication with our East Indian possessions.

This view of the subject necessarily leads us to the main desideratum towards the completion of the successes of our great Australian colonies, by the establishment of a port in one of the numerous deep and capacious roadsteads on the coast of Northern Australia. This desideratum has been earnestly pointed out to this Society on previous occasions by Sir R. Murchison, who has for

many years taken a keen interest in the development of the resources of Australia; and now that we see our way to the formation of direct pathways thither across the continent, our Government may, if unwilling to lead, still deem it desirable to lend a fostering hand towards the formation of a settlement in tropical Australia. The surveys of Captain Stokes, followed by the expedition of Mr. F. Gregory, have completely proved that the eastern inlets of Cambridge Gulf and the mouth of the northern Victoria river are spots well adapted to receive a new colony.

Let it not be said that the heat of the climate, about 15° s. latitude, is a fatal impediment to the flourishing condition of any colony of which Englishmen are the leaders, but not the operatives. Nor let the example of Port Essington, which was occupied for a few years and then abandoned, be cited as a warning against the success of a better chosen settlement on that coast. Port Essington, besides being four degrees nearer to the Equator than the head of Cambridge Gulf, was so ill-selected a spot, so exposed to tornados and malaria, that its failure might *à priori* have been predicted. On the other hand, such a site as that near the mouth of the Northern Victoria, where Gregory's camp was pitched, would ensure a good result. For there our countrymen lived during many months without the loss of a man, and were surrounded by a rich vegetation, including native cotton. To such a settlement Malays, Chinese, and Coolies would easily be attracted by English wages, and, under the influence of the sea-breezes, fine cotton plantations might arise, and thus secure for us in our own Australia the very staple on which the chief manufacture of our country relies.

That North or Tropical Australia is destined to be occupied by our countrymen seems to be no longer doubtful, when we look to the advance made towards it by the other colonies of the continent as well as by South Australia.

Thus, Mr. F. Gregory, whose explorations in the interior of West Australia have already shown to how great an extent flocks may be pastured to the eastward of that colony, and have made us acquainted with the subsoil of large districts, is now at the head of an expedition supported jointly by the British and local governments, which, disembarking to the north-east of the Murchison and Gascoigne rivers, is proceeding towards the same goal whither Stuart is tending from the south.

At the same time we learn from Victoria, that with the hearty approbation of Sir H. Barkly, a great land expedition is proceeding

across the interior aided by camels—animals for the first time employed in Australia.

Again, if we turn to the remarkably flourishing new colony of Queensland, we know from the Governor, Sir G. Bowen, that its most forward northern settlers are already pushing on towards the Gulf of Carpentaria, whilst others are working their way gradually westwards into the interior. By such means therefore we cannot doubt that, as the material interests of the colonists lead them to extend their locations, we shall, ere a quarter of a century has elapsed, have so taken possession of the northern coast that no other nation can occupy grounds on which the British flag was first hoisted by Flinders, and whither we have since sent several explorers. In short, Britain being in actual possession of three sides of this continent can never permit any other nation to set foot on the remaining coast, facing as it does her great Eastern possessions.

In speculating, as many persons have, on the probable sterile and saline condition of a large portion of the interior of Australia, it is fair to say that many solid grounds existed to favour that hypothesis. The absence in the interior of any great rivers announces the non-existence of lofty ranges of mountains, and this fact constitutes the great difference between the central region and the eastern fringe of the continent, where a rocky cordillera, rising to a considerable altitude in its southern extremity, is the source of the mighty Murray river. As this chain arrests the clouds fleeing from the Eastern Ocean, it was naturally inferred that the interior on the west, if unprovided with high hills, must be sterile. And so, indeed, to a great extent, it has proved to be. For, although MacDouall Stuart has shown that along one devious path a traverse can be made from south to north, no sooner did he turn eastwards and follow the small streams which rise in the low ridges on the west as they flow to the central depression, than he found them becoming saline at their mouths, and terminating in a great salt lake ranging from south to north.

That this saline lacustrine depression must have a certain width is demonstrated by the fact, that when Sturt explored northwards to latitude $24\frac{1}{2}^{\circ}$, he found himself in a stony, arid desert, which was evidently the eastern side of that great watery saline north and south depression of which Stuart has defined the other side in a lower latitude.

Judging, then, from our present stock of information, it would seem rational, in the absence of any mountains of sufficient altitude

to condense vapour, and with the knowledge that certain waters flowing from low hills tend to a central depression, to infer that other low saline tracts besides those which we already know of will be detected in Central Australia. This view is, indeed, sustained by the exploration of Mr. F. Gregory in his memorable explorations in North Australia, when, after proceeding from the higher grounds near the northern coast, he descended into a lower interior country, and was stopped by its saline character.

But if such should prove to be the case in the internal tracts immediately to the north of Lake Torrens in South Australia, it is quite within the bounds of probability that the views of Colonel Gawler respecting the valuable and well-watered character of a very large region lying between Western and Southern Australia may be realized. In the mean time enough is already known to enable us to express a confident belief that, ere a generation shall have passed away, all the colonies of Australia will be united, if not by internal roads, at all events by electric telegraphs, whilst through her northern ports she will enjoy a direct communication with India and China.

AFRICA.*

The past year has been characterised rather by the publication of previously completed journeys, and by the outset of new expeditions, than by any accomplished work of actual exploration.

Livingstone is almost the only traveller who has advanced far into Africa since our last Anniversary; and even his journeyings, in which he took back to their home the remnant of that faithful Makololo body-guard whom their chief had confided to his honour, lay too near his previously-described route to afford much geographical novelty. We have, however, from his pen and from that of his brother an exceedingly graphic re-description, careful measurements, and a small map of the unique cataract of Mosioatunya, popularly called in England the Victoria Falls. They show that Livingstone, in his previous journey, had so anxiously avoided exaggeration as to fall into the opposite error, and that he had considerably underrated the scale of this marvellous cataract. It now appears that the river is upwards of a mile in breadth, and that, when flowing over a level country, it comes suddenly upon a connected series of deep and narrow chasms running in abrupt zigzags athwart its bed, but hardly extending beyond it: these finally

* F. Galton, Esq., Hon. Sec., R.G.S.

widen out, and lead away in the general direction of its course. Into the first of the chasms, which happens to be less than 100 yards across, the entire Zambesi tumbles at a single leap (but in many divisions, at least at the time of extreme low water) to a depth of 400 feet, and thus disappears from the surface of the land. After its fall, the river is visible from occasional points of view, struggling in those strangely-contracted and tortuous depths through which it has to make its further way.

By our last intelligence Livingstone's new steamer had reached the mouth of the Zambesi, and he had started in her to explore the Rufuma River, which may prove the most convenient highway from the coast, to the Shirwa and Niassa lakes. Bishop Mackenzie accompanied Livingstone. He had arrived, with about ten members of the Oxford and Cambridge mission, ready to commence operations at such point as Livingstone might recommend. Yielding to his urgency, he has postponed fixing on any locality until the Rufuma shall have been examined: in the mean time the other members of the Bishop's party are located in healthy quarters, in the Comoro Islands. Sad news has been received of the mortality among a party of missionaries who were despatched to the Makololo overland from the Cape.

Between the Rufuma River and the latitude of Zanzibar, we have to lament the failure of two expeditions undertaken with great zeal. The scientific German traveller Roscher was murdered close to the Niassa Lake, and the Baron von Decken, who started from Zanzibar in prosecution of Roscher's discoveries, and in search of his papers, has been robbed, repulsed, and compelled to return. However, in despite of this mischance, his energy is unabated, and he proposes a fresh attempt on a more northern district of Eastern Africa.*

Captain Speke has taken the first step on his adventurous journey towards the sources of the White Nile. At the date of his last letters † he had attained the high plateau of the interior, over which an unobstructed course lay along his old route to the Nianza Lake. Beyond its southern shore that district of mystery begins, whence we shall anxiously watch for his emergence into the basin of the White Nile. But lest he might arrive in distress at those bar-

* Intelligence has just been received by Sir R. Murchison, that the geologist, Mr. Thornton, formerly attached to Dr. Livingstone's expedition, had, after recent travels in the neighbourhood of the Zambesi, arrived at Zanzibar, and undertaken to accompany the Baron Von Decken, who was on the point of starting for the snowy mountains of Kilimandjaro.

† See postscript to the Address, p. 217.

barous outposts of North African commerce during the dead season of the year, when no civilized help is to be hoped for, and when adverse winds and heavy rains make further progress impossible either by water or by land, the Council of this Society has made every effort to utilise the proffered services of Mr. Petherick. That gentleman, H.B.M.'s Vice-Consul at Khartum, who is eminently capable from his position and his experience to render the desired assistance, offered to station himself at Gondokoro until July next, with well-armed and provisioned boats, to await the coming of Captain Speke. On our appealing for the necessary funds to the public, by a circular, in which the urgency of the case was explained, we must all have been gratified to witness the liberal response which that appeal elicited. A sufficient sum was speedily subscribed to carry out the above objects, and Mr. Petherick started last month on his journey.

Two travellers, stimulated by the first news of Speke's discovery of the Nyanza Lake, have anticipated him by a whole year in his present attempt. Both M. Legean and Dr. Peney left Khartum last summer, on the same errand, but by different routes—the former by Kordofan, and overland to the south; the latter in company with a large Egyptian expedition, by boats, to Gondokoro. Dr. Peney appears to have finally set at rest a long-disputed geographical fact, namely, the altitude of Khartum above the sea-level. By the published results of a large number of barometrical observations, he describes it to be 1100 English feet.

Lastly, some allusion must be made to the travels and sketch-map of Miani, who describes his route far beyond Gondokoro through a rugged and mountainous country traversed by the White Nile.

There is yet another traveller, the Austrian Consul at Khartum, Dr. Heuglin, in whom German geographers take an especial interest. He has started for Wadai, in search of the lost papers of Dr. Vogel, and with the intention of further research.

*West Africa.**—In Western Africa the energies of England during the past year have unhappily been more engaged in hostile collisions than in geographical research. The interesting republic of coloured men in Liberia has, like our own Australian colonies, encouraged exploration into the unknown interior behind their settlements which produced the results obtained by Seymour and

* Dr. Hodgkin, Hon. Foreign Sec., &c. &c.

Sims, which were referred to in the last Address. The first of these enterprising travellers started on a fresh expedition, hoping to penetrate still further into the interior; but he has fallen a sacrifice to the hardships and dangers to which he was exposed. He was a man whose name ought not to be consigned to oblivion. As one of the generally unfortunate class of persons of mixed African race, by birth Americans, he had not the advantage of early education, but he zealously improved such opportunities for self-instruction as came in his way; and it is doubtless to this cause that much of the value of the information which his energy and perseverance enabled him to collect is to be ascribed. Although he did not pretend to assign or correct latitudes and longitudes, he was able to note the character of the country, its soils and productions, in a manner well suited to advance the interests of commerce and civilization. His companion, James L. Sims, has for the present settled down, devoting himself to agricultural pursuits.

Some really interesting and valuable information regarding Western Africa, not however strictly geographical, is given by Robert Campbell, who appeared before the Geographical Society last year, in his pamphlet on Lagos, Abbeokuta, &c., printed in Philadelphia; and Alexander Crummell, a coloured graduate and ordained minister of Oxford, now a resident of Cape Palmas, and whose name appears in the President's Address of last year, has also published an important article in relation to the productions and capabilities of the same part of the world.

*Du Chaillu.**—Among the great problems which remained to be solved in South Africa, one of striking interest, which was alluded to at our last Anniversary, has been answered by M. Du Chaillu, a Frenchman by birth and education, and now a naturalized citizen of the United States. We have since had an opportunity of hearing from the traveller himself an account of his strange experience, of seeing his collection of huge anthropoid apes, quadrupeds, reptilia, and numerous birds, and of reading the detailed narrative of his eventful wanderings.

Livingstone was the first to reveal to us the great and important fact, that the region of Central Africa, extending northwards from the Cape Colony to 8° of s. lat., is a plateau-land occupied by great lakes, the waters of which, as previously suggested by Sir R. Murchison, would be found to escape to the

* Sir R. Murchison.

sea through gorges in subtending mountain-chains of greater altitude than the central watery plains. Du Chaillu, on his part, has so extended his adventurous explorations from the Western coast, north and south of the equator, as to describe for the first time the complicated river-drainage near the coast, which he has laid down on a map, and also to demonstrate that a lofty wooded chain extends so far into the heart of the continent as apparently to form a band of separation between Northern and Southern Africa. In many a tract to the north of this lofty zone, Mahomedanism has extended its sway; but to the south of it, in these meridians at least, no green flag of the Prophet has yet been unfurled; while a few zealous missionaries, living on the coasts under the Equator, and on both sides of the mouth of the river Gaboon, have established centres whence to propagate the Gospel of Christ. It was in one of those seats of the missionaries that young Du Chaillu, taken thither by his father who traded in the products of the country, first learnt the rudiments of the languages of the adjacent tribes, and obtained sufficient information to induce him, on his return to his adopted home, to fit himself out with presents, medicines, and arms, and then to enter upon one of the boldest ventures which man ever undertook. In vain had the missionaries and trading blacks dissuaded him from such an undertaking by depicting to him the savage character of the tribes of men (some of them cannibals) among whom he must trust himself, to say nothing of the ferocity of the quadrupeds and the impenetrable nature of the densely-wooded jungles and forests he would have to traverse. An intense love of natural history led him to plunge into these hitherto unexplored wilds. The giant anthropoid ape gorilla,* specimens of which had some years ago been for the first time brought to Europe by traders on the coast, was known to flourish in all his pristine vigour in the interior, and many a curious quadruped and bird were described as being common to that region. The die was therefore resolutely cast by the young naturalist; and, with a few black carriers and canoes, and without one white attendant, he dashed into thickets where no European had ever put his foot. Gaining the goodwill of chief after chief, and being probably con-

* Though a few years only have elapsed since specimens of the great *gorilla* ape were first brought to Europe, there seems to be no doubt that Hanno, a Carthaginian navigator who reached the western coast of Africa southwards, did bring back the skins of the females of certain hairy creatures called Γορίλλαι, and suspended them in the temple of Juno at Carthage, as evidences of the discoveries he had made. (See the Periplus of Hanno, and Du Chaillu's 'Equatorial Africa,' p. 343.)

sidered by their sable majesties as a white spirit whose wrath might be fatal to them, and whom they must therefore propitiate, he has been enabled not merely to describe the singular habits both of the people and of the wild animals, but also to make a sketch-map of the region, and to define the course of the chief rivers, before and after they unite in a network of streams near the coast. When at the extreme eastern point of his tours, the information he derived from the natives led him to believe that the rocky and densely-wooded mountains really extended for so great a distance to the east that they might be supposed to send out embranchments into those highlands north of the Unianyembe Lake of Burton and Speke, which these authors called the Mountains of the Moon. Including periods of return to his friends the missionaries on the coast, and his voyages to and fro, he occupied nearly four years in these arduous explorations, and got together a greater quantity of apes, quadrupeds, and birds (some of them never before seen) than probably ever fell to the lot of one unassisted traveller. It is not our province here to estimate the scientific value of these animals, but we know that, in the opinion of Owen and some of the first zoologists of Europe and America,* M. Du Chaillu has not only added greatly to their previous acquaintance with the fauna of South Africa, but has by his clear and animated descriptions, convinced them that he has been as close an eye-witness of the habits of the gorilla and his associates as he proved himself to be their successful assailant. Strikingly attractive and wonderful as are his descriptions, they carry in themselves an impress of substantial truthfulness.

He has introduced us to many novelties in a hitherto unknown land, partly mountainous and partly plain, deluged with heavy rains lasting nine months in the year, overgrown with gloomy forests, and sparsely inhabited by man or beasts. Although its native tribes seem to be similar in their superstitions, their ordeals, and their customs to those we read of elsewhere in African negro-land, the startling fact is presented to us of an avowed system of cannibalism among at least two tribes, who do not appear to be otherwise remarkable for brutality of character. Some passages

* See Hartlaub's 'System der Ornithologie West Africas,' 8vo., Bremen, 1857 (Preface). Also Cassin's 'Description of New Species of Birds from Western Africa;' 'Proceedings of the Academy of Natural Sciences, Philadelphia, during the years 1855-6-7-8-9.' Appended to these papers, extracts have been printed in his absence from letters to his correspondents—thus furnishing an independent record in the United States of the several journeys of Du Chaillu.

in Du Chaillu's work throw light on the probable origin of this revolting practice. Thus we learn that animal food is exceedingly scarce, and that, while an abundant supply of the vegetables which these negroes cultivate is barely sufficient to supply human wants in their depressing climate, their improvidence constantly reduces them to feed on the still less nutritious produce of the forest. Hence an uncontrollable craving for meat attacks individuals, and constitutes a recognised malady called *gouamba*, characterised by a pitiable state of nervous exhaustion. When this state of things prevails among numerous tribes, each of whom develops its own barbarous customs unchecked by the opinion of the rest, it is credible enough that cannibalism should have been resorted to in many instances, and that its practice should now and then take permanent root and become an established custom. In fact, the same want of animal food in New Zealand led, it is well known, to a similar system of cannibalism, before that country was colonized by Britain.

Aware that the faithful description of a region so exuberant in many natural productions, and inhabited by gigantic apes, and in one part by cannibal races, might probably be doubted, M. Du Chaillu is quite prepared to meet all cavillers and objectors. He knows as well as we do that although many of the discoveries of Bruce in the last century were repudiated and treated as fables, yet that, with the advancement of geographical research, the detractors of Bruce have had their own names consigned to oblivion, while the wonderful and so-called "travellers' tales" of the great Abyssinian explorer have been verified by his followers. Knowledge is indeed much more diffused than in the days of Bruce, and, to the honour of the contemporary press, the narrative of M. Du Chaillu has generally met with fair criticism, while most of the periodicals of the last fortnight have awarded to his work that praise to which, in the opinion of Professor Owen, as well as of many geographers, it is eminently entitled. His numerous friends have now only to express a hope that the work on Equatorial Africa may bring much profit as well reputation to the undaunted explorer, who, despite of numerous fevers, has gone over some thousands of miles of hitherto unknown lands, and has brought to us what most will admit to be unanswerable evidences of his fidelity of observation—evidences which the Council of this Society has considerably allowed him to exhibit in our own apartments in Whitehall-place.

Reverting then to what M. Du Chaillu has accomplished as a geographer, and to the sketch-map which he has prepared, let it be well understood that he never claimed to be a man of science. Far from pretending to have made astronomical observations, or to have determined either distances or altitudes with precision, he has simply told the tale of an adventurous explorer, and has laid down, as well as he could, the outline of his marches and canoe voyages. And when we consider the difficulties he had to overcome, surely we ought to make due allowance, if in the compilation of a work from his rough notes of several years, and in the endeavour to condense the account of so many curious and dangerous wanderings, there are one or two mistakes of dates.

But notwithstanding these defects, no one who reads the work of M. Du Chaillu can doubt, that he did hunt and kill the gorilla in the rocky woodlands of the interior, that he lived among cannibal tribes, and that he has graphically described the physical outlines and vegetation of tracts never before visited by any European. The truthfulness of his statements is indeed borne out by the printed records of the eminent ornithologist, M. Cassin, in the Proceedings of the Academy of Sciences of Philadelphia, at the request of which body he made his second and longest expedition of three years and eight months, and also by references to the very missionaries from whose dwellings he made his excursions.*

Let us therefore unite with our practical geographers, Arrow-smith, Findlay, and others, in attaching due merit to the sketch-map on our walls which has resulted from such labours, and let us join the ethnologists in thanking M. Du Chaillu for his vivid description of wild and barbarous natives. Above all, let us thank him for the indomitable energy and courage with which he has successfully played the part of a bold geographical pioneer.

CONCLUSION.

In the preceding summary of the progress of Geography during the past year, I regret to say that, notwithstanding the various able contributions of my associates, there are still omissions of great import-

* Whilst these pages are passing through the press, an unexpected and unsought-for testimony to the truthfulness of M. Du Chaillu's narrative has been produced by Mr. P. Lund Simmonds, F.S.S., in two letters from his brother-in-law, Mr. Walker, the missionary, who wrote in 1858 and 1859 from the Gaboon country, and who was himself acquainted with the explorations of our traveller, of whose deeds and character he speaks in terms of high commendation. (See the 'Critic,' weekly journal, July 6, 1861, p. 17, for the letters from Mr. Walker to Mr. Simmonds.)

ance which must be supplied at our next Anniversary. Thus, as respects Europe, I have not been enabled to lay before you a notice of the advance of our science in Scandinavia, France, Spain, Switzerland, Italy, Greece, and Turkey.

In our past Session we have, indeed, been favoured, as noted at p. 196, with some accounts of various Asiatic regions, of which the sketch, already alluded to, of the environs of Yeddo, and a journey to the celebrated volcanic mountain of Fusi-yana by Mr. Alcock, Her Majesty's Minister at the Court of Japan, is singularly attractive and interesting, and will form a rich addition to our next volume. For this memoir is not confined to a lively description of the customs and habits of the people, but gives us also a clear insight into their very peculiar political and social condition, which seems to have been permanent for at least three centuries.

Thanks to the triumph of the combined forces of England and France, the natural features of the interior of the Chinese empire are now fairly laid open for the first time to geographical explorers.

Among the efforts which our countrymen may make to penetrate these unknown lands, we have every reason to anticipate most striking and original results from the journey which Major Sarel and Captain Blakiston are now carrying out, by ascending to the sources of the Yang-tse-Kiang, and thence traversing the lofty chain which separates China from Hindostan—a project worthy of a Humboldt.

Again, we are informed that the Government of India, being desirous of ascertaining the real nature of the route between Burmah and China, are about to send a party to determine the position of the hitherto somewhat mythical city of Esmok, to the importance of which, and to the best line of commercial intercourse, our attention has been drawn by Captain Sprye. The re-consideration of these interesting subjects will probably form prominent features of the next Anniversary Address.

In now taking leave of you, gentlemen, for the eighth time, as your acting President, I cannot but feel highly gratified in having witnessed the surprising manner in which our Society has attained its present degree of popularity, and in seeing that it has acquired an influence which is vigorously exercised in promoting the highest behests of geography and travel.

When I bade you farewell in 1859, I prided myself on the fact that our body had increased from 600 to 1200 members, and now I rejoice to announce, that our numbers have further been swelled to

1550; so that we thus actually double the amount of any other scientific body in the metropolis. On a former occasion I had also to congratulate you on having obtained a Royal Charter, in which my efforts to promote your interests were more than fully repaid by the kindness with which you incorporated my name in that important document.

In the distinguished noblemen who succeeded me, we were unfortunately deprived of the valuable services of one, by his being called to take an active part in the administration of the country; whilst our present leader has, through ill health alone, been less among us than it was his earnest desire to be. But whenever Earl de Grey and Lord Ashburton have been able to preside, we have felt that we made a just selection in placing such men at our head, whilst it was pleasing to observe that persons of their social distinction esteemed it a high honour to be our chiefs.

Lastly, let me repeat, that had our actual accomplished President been able to attend this Anniversary, I feel assured he would have rendered better service in advancing our cause than I have been able to do in this emergency; and I therefore earnestly trust that at our next Annual Meeting we may welcome him in such good health, that he will then have it in his power to prove to you how truly he has it at heart to promote the continuous prosperity of the Royal Geographical Society.

P.S.—*July 15th.* The last accounts of the expedition of Captains Speke and Grant, communicated by Lieut.-Colonel Rigby from Zanzibar, are dated Dec. 12th, 1860, from Khoko, in Western Ugogo. The travellers had encountered heavy rains, and had lost some of the native followers and mules; but, nothing dispirited, they had killed rhinoceroses, buffaloes, many varieties of antelope, zebras, pigs, and a giraffe, and were proceeding to Tura and Kazeh.



PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.

SESSION 1860-61.

Fourteenth Meeting, Monday, June 10th, 1861.

SIR RODERICK I. MURCHISON, VICE-PRESIDENT, in the Chair.

ELECTIONS.—Colonel the Hon. Hugh Annesley, M.P.; Lieut.-Colonel J. Dixon; Major Robert Jones Garden; Sir Willoughby Jones, Bart.; Lieut. Langham Rokeby; the Duke of Sutherland; Lieut.-Colonel the Hon. W. P. Manvers C. Talbot; Capt. Henry Thurburn; and G. T. Archer; William Aubin; David Balfour; George Berkley; William Blenkin; Henry Fox Bristowe; Charles Butler; George F. Chambers; J. Coghlan; David Cruikshank; George Hamilton Dundas; Thomas W. Du Pré, M.D.; Henry Edwards; John Bromley Foord; John Gallagher; Alexander Grant; Chas. Hall Hall; Blake Alex. Hankey; Alexander Hector; J. George Hodgins; Jas. Stewart Hodgson; William Kelly; James Lamont; John Pennington Legh; Alexander Ogilvie Lloyd; John C. Loch; Arthur Pemberton Lonsdale; Frederick Pike; Lonsdale Pounden; William Severin Salting; Hercules Scott; Joseph Travers Smith; J. D. Vaughan; Arthur Way; E. Wigzell; and Junius Spencer Morgan, Esqrs., were elected Fellows.

The First Paper read was—

1. *Notes on the direct Overland Telegraph to India.* By MAJOR-GEN. SIR H. C. RAWLINSON, K.C.B., F.R.G.S., &c.

THE author, in describing the present state and prospects of the overland telegraph to India, stated that his communication was wholly based upon public documents, and that he disclaimed all title to appear as the mouth-piece of the British Government.

In the year 1848, the Porte, after long negotiation with this country, undertook to construct, at its own expense, a line of telegraph from Constantinople to Bussorah. The condition was annexed that it should hereafter form a link in the communication between England and India, for it could not be expected to pay except through

carrying British messages. This line is now in working order between Constantinople and Baghdad, a distance of 1314 miles, but the further course of the great Indian communication has not yet been officially decided upon.

The original proposal of laying a sub-fluvial cable from Baghdad to Bussorah, and thence a submarine one onwards, has fallen into discredit owing to the widely-felt mistrust of telegraphic communications under water. Sir H. Rawlinson therefore confined himself to considering the land routes in minute detail. He showed it would be necessary to avoid the disturbed districts eastward of the lower course of the Euphrates, and concluded that a line passing to Teheran appeared the best course. Teheran has peculiar advantages as a principal station : first, because a line passing that way would be sure of the favour of the Persian Government ; and secondly, because it would there be connected with other lines of telegraphs. An electric communication is already established between Teheran and Tabriz, while Persian telegraphy seems likely to progress and to connect itself with the Russian system by way of Tiflis, and even with our Scindian frontiers by way of Herat. After leaving Teheran the Indian line would naturally pass Ispahan and Shiraz and reach Bunder Abbas, at the mouth of the Persian Gulf. From Baghdad to Bunder Abbas would be 1302 miles. Nearly the whole of this route passes over ground with which geographers are acquainted, and a minute description of it is contained in the present paper.

From Bunder Abbas to Kurrachi the case is different, for we know much less of the land. However, the coast virtually belongs to two princes, both of whom are in close alliance with us, and sincerely desirous of aiding the construction of the telegraph ; namely, the Imaum of Muscat and the Khan of Kelat. Moreover, we are not without some direct information, though the Reports which are most valuable are not of recent date :—one of these is by Capt. Grant ('Journal of the Royal Asiatic Society,' 1836), and the other by an Affghan agent named Hagi Abdul Nebi ('Journal of the Asiatic Society,' Bengal, 1844). Lastly, the steamers of the Indian Navy have been in the habit of touching at several points along the coast, and the *Zenobia* has been recently sounding close in shore. Officers will probably soon be deputed to execute a complete survey of the route along the coast. In the mean time preliminary reports have been received from the Commissioner in Scinde, and from the agent for the Government of India with the Imaum of Muscat, which are as favourable as could be wished.

From Bunder Abbas to Kurrachi would be 731 miles, and there-

fore the entire distance from Constantinople to Kurrachi by the line described by Sir H. Rawlinson would amount to 3351 miles.

SIR RODERICK MURCHISON said he thought they ought to renew their thank to the distinguished author of the paper they had just heard. They had great reason in that Society to be proud of Sir Henry Rawlinson, because they had a right to flatter themselves on the fact that the Royal Geographical Society was the first scientific body that, many years ago, perceived his merits. It was to them that Sir Henry communicated his first work on the North of Persia, and for that communication the Geographers adjudged to him their Royal medal. He did not say that that medal had incited him to do all the great things he had done since, for Rawlinson would have risen through every difficulty; without that reward he would have discovered the ruins of Babylon and deciphered the unknown languages of its peculiar inscriptions; but they had a right to flatter themselves that they were the first to discover the merits of that remarkable man. The paper that he had read had been put before them in a very clear manner, and showed distinctly what was doing and what had been done in connecting England with our East Indian possessions. There were several gentlemen present who had traversed those regions, amongst whom were Captain Selby and Captain Lynch, and no doubt they would give the Meeting their views on the subject.

CAPTAIN LYNCH thought the subject one of the most important ever brought before the Society. It had long engaged his attention, and he believed it the true path to India. He would, after the clear manner in which the paper had been brought before them, only allude to that part of the country which lay between Shiraz and Bunder Abbas. He had examined it many years ago, but not with reference to a telegraphic communication, and he still retained sufficient recollection of the route to know that between Shiraz and Bunder Abbas not the slightest physical difficulty would be experienced in establishing a telegraphic wire. It was a beautiful country, rising by steps from the Persian Gulf. The telegraphic wire would be perfectly safe in all that part of the country.

CAPTAIN SELBY said he had only just come from Baghdad, a part of the country where the telegraph had been laid, and could say it had been entirely successful. The wire had been carried over mountains, and over a part of the country where it would have been thought hardly possible to have done so. It had been laid throughout with great perseverance, and he had no doubt it would succeed. The first message was brought from Constantinople to Baghdad whilst he was there, and a very important message it was. When he was at Mosul the line was in perfect working order, and messages were constantly being transmitted. But he very much feared that, if left in the hands of Turkish officials, it would be conducted at much greater cost, and under much greater difficulties, than under English supervision. The Kurdish and Arab tribes had no belief that anything introduced by the Turks into their country could be for their good, and they would look upon the line as the forerunner of other and stronger measures for their repression. Indeed, when at Diarbekir on his way to England, he was present at an interview between a sheikh of the D'thuffeeah Arabs and Mr. John Taylor, our consul at that town. Enjoying, as this gentleman does in a most marked and perfect manner, the entire confidence and affection of all the Arab tribes among whom he has been, speaking their language perfectly, and entirely conversant with all their manners and customs, his home is ever the resort of all who have known him in the desert, and who seek him either to renew old friendships or to ask counsel in times of difficulty. The conversation turned on the line that was then being carried through the country, and Mr. Taylor asked the D'thuffeeah whether the Arab tribes would let it pass through the desert. "If in your hands,

yes," the D'thuffeeah replied; "but if in the hands of the Turks we should destroy it, looking upon it but as the forerunner of forts and soldiers to coerce us." He was also opposed to the submarine line from the Persian Gulf to Kurrachi, except close in shore along the Mukran coast; the bank of soundings was very irregular, and experience had proved that in very deep water there were difficulties to be overcome which as yet we had not taken into account. For his part, he believed that the enormous pressure to which the wire was subjected at great depths destroyed the insulation.

SIR CHARLES BRIGHT was sure that all those who, like him, were interested in telegraphic enterprise, must have felt greatly indebted to the gentlemen who had spoken, for the manner in which they had treated the subject. To have telegraphic communication with India was of vital interest to the country, and it was most satisfactory to be assured by travellers acquainted with the country, that it was possible to have an overland communication to India. But at the same time they must not be dependent altogether upon this proposed route *via* Baghdad. The overland line could be worked very well in times of peace, and the difficulties of maintaining it might have been overrated; but it was necessary, looking forward to the possibility of times of trouble, that we should have an additional line of communication with India, seeing that there were really no natural obstacles of any consequence by the other route. It would not do to be dependent upon either the Turkish or the Persian Government; he therefore felt that they must have a direct line of communication by submarine wires laid down the Red Sea to Aden and thence to Kurrachi, in addition to the line described by Sir H. Rawlinson. That gentleman had started in advocating the line upon the assumption that submarine enterprise was at a standstill, and hitherto had been unsuccessful. In that he (Sir Charles) did not agree with him. The public did not always hear of those cables which were worked with success; they did not hear of those lines which were carrying our messages daily to the Continent, and working excellently in many other parts of the world. There were twenty-six different wires—some laid in shallow and some in deep water—working successfully to various parts of the Continent alone, without enumerating many others elsewhere, which had never ceased to work for an hour, and had not cost a shilling for repairs since the day they were laid. He thought Sir Henry, if he was acquainted with the real causes of the defects in the present Red Sea line, would agree with him that a line ought to be laid down the Red Sea as well as along the shores of the Persian Gulf. They ought to have by sea a massive durable line laid down with every appliance that modern science could suggest; and if this were done judiciously, and without parsimony, he was sure that this country would have a complete communication with India, and thence to Australia, of the most certain and permanent character.

MR. GEORGE SHAW LEFEVRE said he thought that some credit should be given to the much-abused Turkish Government for the enterprise they had shown in laying down a line of telegraph to Baghdad—a work of far greater importance to our country than to their own. He was about four years ago at Constantinople with the officers in the employ of the Euphrates Telegraph Company, and was witness to the intrigues which took place on the part of the Austrian and Russian diplomatists to prevent the formation of the line proposed by that Company, which was identical with that now completed as far as Baghdad. By the aid of Lord Stratford the consent of the Turkish Government was after many weeks obtained, but at the last moment the Company were thrown over by the home Government, owing to the recommendation of the late Mr. Wilson in favour of a Red Sea line and an Austrian line from Alexandria to Trieste—a decision which was most unfortunate, as it had postponed for some years the completion of telegraphic communication with India. He quite agreed with the last speaker that we should have a second line to India, but certainly not that which he advocated, the defunct Red Sea line. He should recommend, if the

Turkish line were continued from Baghdad to Ispahan, as proposed by Sir H. Rawlinson, that a line should be made from Ispahan to Tiflis, to which place he believed that the Russian Government had already laid down a telegraph, or were shortly intending to do so. It was to be noticed Tiflis and Ispahan were points upon the shortest line which could be drawn from London to Kurrachi, namely, the arc of a great circle, whose course would lie through the centre of Germany, the south of Russia, the Crimea, Tiflis, Persia, and Beloochistan. After what had been said to-night he believed that line to be practicable throughout.

SIR RODERICK MURCHISON said one of the Council of India was present, and he was sure the Meeting would like to hear him speak upon the subject.

MR. PRINSEP thought it was hard to be called upon to speak upon the geographical merits of a line with respect to which he could boast of no personal knowledge. All he could say was, that as a member of the Council of India he had always supported a land line in preference to a submarine one. He thought the idea of a submarine cable was chimerical. If one were laid down, he did not think it would be lasting; and those who speculated in submarine telegraphs, if once a failure took place, lost the whole of their capital. He had not the slightest doubt that the line which Sir Henry had brought before their notice would be laid successfully. The Government of India and the Government of England were both in favour of the enterprise. As regarded the extension of the line to our colonies, that was quite a new and a difficult question. There had been an attempt to carry a line via Singapore and Java, and thence to Sydney, but the cable met with an accident; and now they were going to lay the line from Egypt to somewhere in the Mediterranean. The Government had given up the idea of laying the cable to Singapore, as they did not think it could be successfully laid in the way it was intended.

SIR CHARLES BRIGHT.—A portion has just been laid from Malta to Tripoli.

MR. MARSHMAN said he did not come to the meeting with the intention of saying anything, but he felt called upon to say a few words respecting the Red Sea telegraph, and in the first place he must mention that his friend Mr. Prinsep was misinformed when he said those who embarked in that undertaking would be losers.

MR. PRINSEP.—Not forgetting the guarantee.

MR. MARSHMAN said they had a guarantee from Government of $4\frac{1}{2}$ per cent., so that there could not be a doubt as far as the security of those who had embarked in the undertaking was concerned. He had alluded to the guarantee, which was a matter of the highest importance to the body of shareholders. With regard to the line itself, they must be fully aware that messages were conveyed by it for five days between Alexandria and Calcutta, and on one occasion a message was received from Calcutta to London, through the wires of the Red Sea telegraph, in six days, five days of which were occupied in conveying the message by steamer from Egypt to France. Some of the sections of their cable had given way, and they had not been able to go on with the repairs, because the Treasury had not yet given their sanction to the operation.

SIR RODERICK MURCHISON thought that, as Sir Henry Rawlinson had not said a word against the Red Sea line, the discussion had better be confined to the paper, which was the overland route.

MR. CRAWFORD would not have risen to say a word upon the subject, had it not been for the two last speakers. The Government had already sunk some hundreds of thousands of pounds upon oceanic cables, and he hoped they would never try them again. Whatever attempts might be made, he believed they would fail. By the Red Sea cable the shareholders had lost nothing, but Government had lost 800,000*l*. The shareholders of the At-

lantic cable had lost everything, and he repeated that he hoped they would never hear anything more about those distant oceanic cables. He was very much obliged to Sir Henry Rawlinson for his paper, for it dealt practically with a most important subject.

SIR RODERICK MURCHISON said that before Mr. Markham read his paper he had to apologise to the Meeting for the unavoidable absence of their President, Lord Ashburton. The President's next soirée was fixed for Wednesday the 19th inst., when his Lordship would be glad to see them all at Bath House. He also wished to state that they had a recent communication from Dr. Livingstone, which showed that he had made an attempt with the *Pioneer* to ascend the river Rufuma; and, after grounding several times, he had been obliged to desist, returning to the mouth of the river, and finding his way back to the Zambesi, with the intention of going to his old country waters by the Shire.

The Second Paper read was—

2. *Sources of the River Purus, in South America.* By C. R. MARKHAM, Esq., F.R.G.S.

MR. MARKHAM had been employed on a special service by H. M.'s Government in the early part of this year, to collect cinchona plants in South America—a duty which led him to explore the country immediately to the n. and n.w. of Lake Titicaca. There arise the rivers Madre de Dios and Ynambari, which are the chief headwaters of the still unexplored Purus. The Purus is the only great southern affluent of the Amazon which is entirely unknown to geographers, although, from its position and body of water, it seems destined to become the most important of them all. Without Mr. Markham's sketch-map it is difficult to explain the results of his explorations. They were chiefly in the province of Carabaya, which lies at the foot of the Eastern Andes, extending from Marcapata to the frontier of Bolivia. The history of this province dates from Inca historians, by whom we hear of it yielding great quantities of gold, and is continued in Charles V.'s time, when a party of runaway gold-digging mulattoes settled in it. Ultimately the Spaniards took possession. About seven years ago it attracted attention anew, and became a sort of California to South America, but success in gold-digging was found uncertain, and the excitement died away. Crucero, so called from the number of roads that cross in the place, is the mud-hut capital of the province, planted on a bleak table-land, 13,000 feet above the sea. On the west snow-mountains rise high above the town, but eastward the descent is rapid into the forest-covered plains of South America. In these warm slopes lie all the wealth and population of Carabaya. Its population is about 22,000, and they export cocoa, coffee, chili pepper, and gold. The valleys between the consecutive spurs of the Andes are described in order by Mr. Markham; the direct roads

from one to the other are so difficult, that it is often more troublesome to cross the intervening ridges than to travel up to Crucero and thence down the valley aimed for. To these geographical features is due the importance of the seat of the capital. Sandia is the most important of the valleys, and is the one where Mr. Markham stayed the longest. Its sides are terraced with the now abandoned gardens of the Incas, and the scenery—a mixture of tropical vegetation with crags and snowy mountains and silver torrents—is described as of superb beauty. Abundant cinchona-trees are found there.

SIR RODERICK MURCHISON thought they were very much indebted to Mr. Markham for the services he had rendered. He was one of the few travellers who had examined both sides of the Andes. Mr. Markham had recently been actively engaged in transporting the cinchona or bark-plant to India, to establish plantations of it in a country where vast sums are expended in the purchase of quinine to keep in health our troops and the natives employed by us. He (Sir Roderick) could not adjourn the Meeting without warmly congratulating them on the success of the Session just ended.

The proceedings then terminated, and the Meeting was adjourned to the next Session.

ADDITIONAL NOTICES.

1. *Currents and Icedrifts on the Coasts of Iceland.* By Capt. C. IERMINGER, of the Danish Navy, Corresponding Member R.G.S.

IN the northern part of the Atlantic Ocean the surface-water sets steadily with a gentle flow towards the north. Coming, as it does, from more heated regions; and being constantly provided by fresh supplies of heated water, it maintains, as is well known, a moderating influence on the climate of the coasts which are washed by it.

Between Iceland and Norway this current takes a north-easterly direction to the Icy Sea, but without touching the extreme eastern coast of Iceland. It tempers the climate of the Faroe Islands, Shetland, &c.; and its influence is so considerable on the coasts of Norway, that harbours, even up to the North Cape (which is in about 71° lat. N.), admit shipping the whole year round, while in the coldest time of winter it is only the innermost of the smaller bays in the fiords that are covered with ice.

To the westward of the meridian that halves Iceland, the current from the south runs in a north-westerly, or even more northerly direction, until it is stopped by the current from the sea around Spitzbergen. This "Arctic current" runs south-west; it passes the north-west coast of Iceland on its way to Greenland, along whose coast it makes its way and rounds Cape Farewell. The first-mentioned current from the Atlantic Ocean washes the south-west and west coasts of Iceland, and is found to run true N. 33° W. at the rate of 1.19 nautical mile in 24 hours, throughout an area extending between W. long. 18° , N. lat. 62° , and the south coast of Iceland towards Cape Reikianæs; but, west of

Iceland, between N. lat. $64^{\circ} 15'$ and $65^{\circ} 50'$ and W. long. $23^{\circ} 51'$ and $25^{\circ} 48'$, to run N. 15° W. at 4.8 nautical miles in 24 hours.

During a protracted stay on the west coast of Iceland I have frequently been convinced of the fact, well known to fishermen there, that the current along the west coast of Iceland, in addition to a regular ebb and flood, considerably preponderates towards the north.

The annexed table, representing the temperatures of the surface of the sea in June, 1846, shows where the warmer current, running northward on the west side of Iceland, met the cold current from the Icy Sea off the north-west coast of Iceland.

1846, June 23, 6 P.M., the man-of-war brig <i>St. Croix</i> , Capt. E. Suenson,						Fahr.
was in $65^{\circ} 54'$ lat. N., and $25^{\circ} 5'$ long. W., and found the temperature of the sea						$^{\circ}$ 49.1
June 24, 6 A.M., in $66^{\circ} 22'$ lat. N., and $26^{\circ} 13'$ long. W.						35.6*
„ 9 A.M., in $66^{\circ} 30'$	„	$26^{\circ} 14'$	„	„	„	32.5
„ noon, in $66^{\circ} 17'$	„	$25^{\circ} 39'$	„	„	„	37.6
„ 4 P.M., in $65^{\circ} 53'$	„	$25^{\circ} 11'$	„	„	„	46.4
„ 8 P.M., in $65^{\circ} 38'$	„	$24^{\circ} 17'$	„	„	„	47.5

* Drift-ice in sight to the N.E.

The current which comes from the Atlantic not only moderates the climate of the south-westerly and westerly coasts of Iceland, but is also the cause why the so-called "Greenland ice," which is constantly found driving towards Greenland and along its eastern shores, does not visit the west and south coasts of Iceland. There, even if the greater part of the fiords and coves should be frozen up in a severe winter, the fishermen can keep their fishing going throughout the whole year in the two great bays, Faxe- and Brede-Bugt, because these bays never freeze up, owing to the influence of the warm Atlantic current. Again, although the days in the latitude of Iceland are very short in winter and the weather stormy, yet the vessel that carries the mail has succeeded, even in the middle of winter, in carrying on its voyages with regularity between Havnefiord (at Faxebugt) and England. It has never been stopped either by the Greenland ice or by the ice from the fiords or the coves.

Warm currents do not moderate the climate of the north-west, north, and east coasts of Iceland; on the contrary, these parts of the island are exposed to the cold currents from the Icy Sea, which frequently bring ice from the sea around Spitzbergen, by which navigation is frequently impeded to the greater part of the harbours here situated.

Though ebb and flood exist on all the coasts of Iceland, yet the current prevails from west to east near the north coast; possibly the cause of this is that a portion of the Arctic current impinges against that part of the north-west coast of Iceland which turns its face to the Icy Sea, and produces an eddy which runs to the eastward along the north coast of Iceland, in a nearly opposite direction to the principal stream of the Arctic current farther north.

Likewise, on the east coast of Iceland, the current is chiefly formed by an eddy, prevailing, in certain seasons at least, to the southward; a direction nearly contrary to the principal current, which, as before mentioned, sets to the north-east between Iceland and Norway. The wind has, however, much influence on the direction of this coast eddy; for though it is usually much easier to beat up to southward than northward through the help of this current, yet it does not escape the attention of the fishermen, who every year are lying on the fishing banks along the east coast, that the current may prevail to the north, when there is blowing weather from the south-west and south.

To give an idea of the force of the "Arctic current" I only need to call to mind some of the many whalers which, while being beset in various times, were carried along by it, together with the ice in which they were imbedded.

For instance, in 1777, many whalers were enclosed by the ice between Spitzbergen and Jan Mayen, and they were driven, while beset, in four months to Cape Farewell, a distance of 1400 nautical miles, with an average speed of between 11 and 12 miles in 24 hours.

W. Scoresby mentions (vol. i. p. 213) several cases in which ships, being beset between Spitzbergen and Greenland, were drifted along with the ice towards the south-west or south-west-by-south. One was a case in which a vessel drifted 182 miles in 13 days, giving a mean of 14 miles per 24 hours; another in 9 days 120 miles, or 13 miles in 24 hours; a third 420 miles in 49 days, or 8·7 miles; and a fourth case, 1300 miles in 108 days, averaging 12 miles per day. The mean of all these cases gives 11·9 miles in 24 hours; and it can therefore be assumed without much risk of error, that the mean rapidity of the Arctic current is 11 or 12 miles in 24 hours, at least during the season of navigation.

It is a well-known fact that the situation of the ice in the Icy Sea is subject to considerable changes from one year to another, for where an impenetrable ice-barrier was found in one year, vessels could in another year sail several degrees farther without being stopped by the ice; and, on the other hand, where the sea was void of ice one year, it might be impossible to penetrate so far north in the succeeding one.

The amount of the icedrift may thus be very different one year from another, and in proportion as the masses are greater which are carried away by the Arctic current from the Icy Sea, the more will the strait between north-west Iceland and Greenland become filled with it. Ice is nearly always met with here by fishermen, who ply every year from the harbours of the north-west coast of Iceland; they usually fall in with drift-ice in the strait between Iceland and Greenland at from 40 or 60 to 80 miles from Iceland.

This icedrift is frequently much more considerable. In such cases it fills not only the strait between the north-west coast of Iceland and Greenland, so that for long together it is impossible to round Cape Nord, but it also encloses the whole coast to unknown limits northwards and far to the eastward. To give an idea of the vast extent of an icedrift like this, I may mention that the distance between Iceland and Greenland is at least 160 nautical miles, and assuming the rapidity of the current at only 11 miles in 24 hours, it will follow on calculation that a mass of ice of not less than between 1700 and 1800 square nautical miles in area will have been carried away to the south-west every 24 hours from between north-west Iceland and Greenland.

This so-named Greenland drift-ice consists for the greater part of fields of ice, often piled on one another: these have been produced on the surface of the sea, sometimes to a thickness of 5 or 6 fathoms. Secondly, it consists of swimming icebergs, loosened from glaciers, and fallen into the sea; their size is sometimes so considerable that they have been seen grounded in more than 80 fathoms water.

When this ice, carried by the Arctic current, arrives at the coasts of Iceland, it brings with it a cold very prejudicial to vegetation. Usually the ice appears first on the coast near Cape Nord; it then drifts on the north-west coast, enclosing the fiords between Patrik's and Isæfjord; and it will happen, though rarely, that part of this ice passes Fugle or Staalberghuk, and drives in the direction of the Bredebugt. The north coast of Iceland is then more or less enclosed; a considerable drift sets down to the bay of Skagestrand, and occasionally reaches even to the eastward of Langenæs, whence the current carries it upon the east coast of the island; and as the ice on the north as well as on the east coast is usually more compact than off the north-west fiords, the navigation there is sometimes wholly impeded from January or February until the following summer-time. When there is much ice on the east coast of Iceland, it may happen that some of it will drive round the south side of the island, though this never hinders navigation to the western coast.

The quantity of the ice, as well as the periods of its coming and leaving the coasts of Iceland, are very different. Some years, a great part of the coasts are enclosed by it; other years, it does not appear at all. Very seldom it comes before January or February; most frequently it comes in spring, and sometimes a little later. It is remarkable that the ice, even when the masses which enclose the coasts of Iceland are very considerable, always leaves the coasts by August at the latest.

That not only the icedrift but also the severity of the winters of Iceland are very different in different years, is well known from ancient and recent observations. Thus the annals of Iceland state in reference to the year 1348, "The winter was so severe that the sea was frozen around the island: it was possible to ride from one neck of land to another, and all the fiords were frozen up with ice." In the year 1615 it is mentioned, "That the Greenland ice enclosed the island in such a way that seals (*Vade Sæle*, a species of seal following Polar ice) were caught in 'South on the Nazes;' a great quantity of bears did likewise then come to the country, and some of them were killed on the south side of it; many large vessels, which were visible from the land, perished with crew and all."

Considerable ice-drifts have occurred in recent times. From notes communicated to me by Mr. Thorlacius, living at Stikkelsholm on the Bredebugt, by Mr. Sigurdsson, and by others, I find that the Greenland ice drifted into the north-west fiords (between Staalbierghuk and Cape Nord) late in December 1858 and in January 1859, and that about the same time ice appeared on the north and east coasts of Iceland, but left them a short while after. In February and March it returned, and enclosed the shore from Staalbierghuk to Cape Nord, also the whole north coast, even to eastward of Langenæs, and, lastly, a considerable part of the east coast, whence masses of ice drove along the south side of Iceland, passing Portland and Reikiansæ. The fiords from Staalbierghuk, around the whole north coast and for some distance down the east coast, were filled with Greenland ice, which froze into a single mass with the winter ice in the fiords, and in consequence the ice did not break up in the north-west fiords before May; in the bay of Skagestrand not before June.

Still it seems that there was even more ice in 1807. The annals of this year mention, in addition to nearly the same facts as those observed in 1859, that "From the most elevated mountains on the north and east coasts no open water was visible; that the inhabitants from Grimsöe, which lies more than 20 nautical miles from the north coast of Iceland, went in spring over the Greenland ice to the trading-place Ofiord, and that several pieces of that ice were carried from the east coast round the south coast, and were seen in Faxebugt and Bredebugt; a state of things which nobody could remember to have been seen before."

As icedrifts along the south coast are unusual, I take the liberty to mention some other cases, the more readily as they confirm what I have already said on the setting of the current along this part of the coast of Iceland.

Mr. Abel, who was "Sysselmand" (functionary) in Westmanoe from 1821 to 1851, writes to me as follows:—"On the 26th of May, 1826, with calm and clear weather, a great quantity of ice was discovered from Westmanoe driving with a speed of 3 or 4 miles an hour from Portland along the coast to westward. When it came near to Elleroe and Biarneroe, two little islands between Westmanoe and the south coast of Iceland, several of the icebergs grounded to the east and south-east of them, and some larger icebergs grounded to the southward of Biarneroe, in 60 fathoms water. The mass of ice entirely covered the sound between Westmanoe and Iceland, being about 8 nautical miles in width, while it was not possible to discover how far that part of the ice stretched which passed to southward around Westmanoe. The passage of this

icedrift from beginning to end lasted between 4 and 5 hours. During a continuance of calm and clear weather and a perfectly smooth sea some majestic icebergs, which had grounded, remained in their places; now and then they changed their form, when considerable pieces broke loose and plunged in the sea. At last, on the 8th or 9th of June, a high swell carried off these remaining icebergs in the same westerly direction as the former ice."

Mr. Abel mentions that the oldest inhabitants had never seen such an ice-drift from Westmanoe, and that none had subsequently appeared, excepting a few fragments of Greenland ice in one year (the exact date is not mentioned, but between 1830 and 1840) and also in the year 1840. He further remarks, that during his thirty years' residence on Westmanoe he never had found it so cold as during the icedrift of 1826. The window-panes in his sitting-room were entirely frozen over during its occurrence, and it was not possible to thaw them by heat from the stove.

Undoubtedly the year alluded to by Mr. Abel as between 1830 and 1840 must have been 1834; for the present Bishop Thordersen, at Reikiavik, whom I visited at Odde very many years ago, where he was then the minister, writes to me: "During my residence at Odde, from 1825 to 1836, I saw twice from my home the Greenland ice drive between Westmanoe and the continent with considerable rapidity to westward. It was an imposing view. When the ice was first seen by the naked eye, it had the appearance of large vessels, but with a telescope I soon discovered it to be icebergs accompanied by great masses of field-ice. I can only recollect the date of one of these two years with certainty—it was 1834; the other year I have forgotten; but I recollect that when travelling to Reikiavik in the autumn of the year I do not remember (1826?) I saw at Orebak one of these icebergs which accidentally had stranded there, and which had, as well as I can remember, a height of at least 8 feet above the surface of the sea even after the heat of summer."

In 1859 an icedrift again passed Westmanoe. Some ice grounded at the entrance of the harbour and entirely blocked it for several days: this event must be considered as a very rare one.

It is not improbable that the very considerable icedrift of 1826 which, calculating from the data given above, must have covered an area of at least 200 square miles, may have been accompanied by ice-bears as well as by seals. These animals, as is well known, are found very frequently on Polar ice, and are carried away with it on its drift to the southward, and therefore it would not have been impossible that some of these animals, as in 1615, might have been killed "on the southern headlands of Iceland."

The reports of the year 1807, that some flakes of Greenland ice had been visible in the Faxebugt and Bredebugt, having come from the east coast round the south side of the island, can perhaps be explained thus: that the ice, after having passed Reikianæs and followed the run of the current in a north-north-westerly direction, was conveyed to the Faxebugt and Bredebugt by continual gales from the west.

This ice is a great rarity in the Faxebugt; but when it is known that stormy weather has influence on the usual direction of currents, and that about one-ninth of the driving ice is above the surface of the sea, and exposed to the immediate action of the wind, it may well happen that pieces of ice should appear where no such ice had previously been seen in the memory of men.

Besides repeated stays of long duration at several places on the south coast of Faxebugt, I have travelled on the south side of Bredebugt and the north side of Faxebugt; by proceeding from Stikkelsholm, travelling to Gronnefjord and Olufsvig, and going around the Sneefields-Jokul to Stappen, Budenstad, Miklaholt, &c. Everywhere I interested myself in obtaining a knowledge of the drift of the Greenland ice, and asked frequently if it was ever seen from any of

these places, but always received an answer in the negative. However, Mr. Olausen, who resided at Olufsvig during many years, communicated to me that, in 1830 or 1831, he had heard from an old man, who at that time lived at Olufsvig, that he could remember once, when a child, to have seen an iceberg stranded in the Brødebugt north of Grønnefjord. This iceberg lay grounded for some time; it came nearer the coast during a spring-tide in May, and it disappeared after the first spring-tide in June. According to the age of the informant, it is not improbable that this happened in 1777, the year when so many whalers were lost in the enormous masses of ice which were driven to south-west, between Iceland and Greenland.

I have taken the liberty of speaking minutely about the rare occurrence of ice on the west coast of Iceland, because a renowned English author has mentioned that intelligence had come to his notice that all the bays and creeks of Iceland, in 1816 as well as 1817, were filled with Greenland ice. According to the accounts given by me above, this cannot have been the case, at least so far as the Faxebugt and Brødebugt are concerned.

In recent times there are proofs that ice-bears have come with the Greenland ice to the north-west and north coasts of Iceland, where this ice is so frequent. In a letter from Mr. Thordersen I see that such an ice-bear was shot in Strande-Syssel a few years ago. There are traditions in Iceland that these bears now and then have killed cattle, and done other mischief; but usually they, like the bear killed in Strande-Syssel, have been of a peaceable nature, and it is a common saying in Iceland, that the bears constantly watch the opportunity to get off with the ice: as soon as it leaves the coast, they swim out to reach it.

According to information I have received, Iceland has been visited by the Greenland ice thirty-three times between the years 1800 and 1860 inclusive. On every occasion it came to the north coast, which was beset by it, and on nearly every occasion, during these thirty-three years, the coast between Cape Nord and the bay of Skagestrand was beset by it. Thirteen times it enclosed the whole of the north coast to Langenæs, and even farther to the eastward; fourteen times it lay outside the north-west fiords, between Staalbierghuk and Cape Nord, and blocked them up (either all or a few of them); thirteen times ice has appeared on the east coast, in various quantities; and in five different years ice has been driven from the east coast to the westward, along the south side of Iceland.

While travelling in North Iceland, I saw the Greenland ice from the mountains near Vellir, for the first time, on the 27th of July, 1834. I remember it was extremely clear on that day, and the sun felt very warm when riding on the paths between the mountains of the Nord-land. When I first came in sight of the Icy Sea, being unaware of the neighbourhood of enormous masses of ice, my surprise was so great that I called to my fellow-travellers who were behind me, "What a storm on the Icy Sea!" But, what I had presumed to be the foam of the waves and breakers, I soon discovered to be a quantity of the Greenland ice, by which the whole of the north coast and a considerable part of the east coast were enclosed in that year.

On my return to Reikiavik I inquired if any of the newly arrived vessels had fallen in with ice, and from many seafarers at Reikiavik, Havnefjord, and Kieblevik, I obtained the answer, that neither this year, nor at any time formerly, had they ever fallen in with ice on their voyages to or from those ports. I happened to be in Iceland both in 1826 and 1834, which were two of the five recorded years in which Greenland ice was driven along the south coast, and notwithstanding that both of these years I spent the greatest part of the summer on the south land of the island, I never heard mention that any seafaring man had fallen in with Greenland ice on the voyages between Europe and this part of Iceland, which sufficiently proves that icedriffs going along the

south coast of Iceland are such insignificant objects in the great ocean, that they do not impede navigation in any way.

I have already mentioned that experience teaches that the Greenland ice, even when it encloses the north and east coasts of Iceland in great masses, always leaves the coasts again in the course of August, if not earlier. I will now inquire into the reason of this, or at least give some hints which may throw light on the phenomenon.

1. A partial cause may perhaps be found in the melting of ice and snow on the enormous jokuls and snow-covered mountains in the interior of this great island. When travelling in Iceland in the warm season, in which the sun is nearly always above the horizon, it does not escape the traveller's attention, that the amount of melted ice and snow is very considerable, and I will try to give a proof of it. At the end of July, 1834, between Holum and Ofiord, I passed Heliardalsheden, which at the most elevated part of the road is about 2000 feet above the level of the sea. From a little glacier here, the "Svarfaraa" has its source. On following the course of this stream, a great many rivulets which all had their origin in the melted ice and snow, fell into the Svarfaraa; and in the valley, 8 or 10 miles from its source, this stream, which does not at all belong to the great watercourses of Iceland, had grown to an extremely rapid river. By considering how small is the area from which the Svarfaraa has its nourishment, we may estimate the very considerable quantity of water which is carried out into the sea from the whole interior of Iceland, by many other rapid and greater rivers, and it will not then appear improbable that the melting of the snow, which undoubtedly is greatest in July and August, and the consequent increased flow of the rivers, might contribute to remove the sea-ice farther from the coast. But if the ice from the east coast drifts out to sea within range of the principal current, which runs at a certain distance from shore, it will find its way to the Icy Sea again; for, as I have already mentioned, the principal current between Iceland and Norway is north-easterly, towards the Icy Sea. Again, if the ice which encloses the northern coast of Iceland be drifted out to sea, within range of the great current opposite, it will be carried away between Iceland and Greenland, and farther.

2. It is well known, and confirmed by the excellent charts on storms in the Atlantic, by Capt. Maury, that June, July, and August are the months in which the Northern Atlantic is least exposed to stormy weather; and as the prevailing gales in this part of the Atlantic are from the west, it is not improbable that the current coming from the south, and running between Iceland and Norway during the other months, in which the most blowy weather takes place, should, in the calm summer season, run somewhat more westerly and nearer to the eastern coast of Iceland. If so, it would contribute to remove the ice from its shores.

3. It is also well known that the limits of the Gulf Stream are very changeable in the different seasons: thus, in the meridian of Cape Race, its northern limit in winter is about north lat. 40° or 41° , while in September, when the Gulf Stream is most heated, it reaches 45° or 46° .* It is highly probable that this current changes its position within defined but wide limits, or as Maury strikingly remarks, the Gulf Stream "may be supposed to waver about in the ocean, not unlike a pennon in the breeze." These variations of its course may extend to the latitude of Iceland, or even still farther north; and perhaps a branch of this stream in the summer season may swing somewhat nearer to the east coast of Iceland, and, turning along its north coast, may thus contribute to the ice leaving its shores. On examining the temperature of the surface of the sea on the east and north coasts of Iceland, it appears undoubtedly, that the eddy of the Arctic current, along the north coast of Iceland, does not exist

* Maury's 'Sailing Directions,' vol. i. p. 99. July, 1858.

in July and August: it is therefore probable that that eddy which, during the greatest part of the year, runs towards east, is displaced in the course of the summer by the current coming from more southerly latitudes. It is likewise remarkable that the temperature of the sea, on the east coast of Iceland, is not so high as it appears to be along the north coast; and the supposition is reasonable that the warmer current, on bending in a westerly direction, passes Langenæs along the north coast, without touching the shores of East Iceland. It is well known that the surface of the sea, even in high latitudes, can maintain a high temperature. Parry found 39° Fahr. on his voyage in summer from Farøe to Spitzbergen, even in north lat. 73° , and east long. 8° , and I shall corroborate this observation by a fact observed last year.

The schooner *Fox*, Captain Sodrøing, left Copenhagen in February, bound to the Icy Sea; an extract of its logbook gives the following:—

OFF LINDESNÆS, IN NORWAY.

		North Latitude.	Longitude from Greenwich.	Temperature of the Air.	Temperature of the Sea on the Surface.
	1860.	° ' "	° ' "	°	°
February	28 ..	.. ..	.. ..	36·5 Fahr.	37·7 Fahr.
"	29 ..	58 32	4 22 East	38·8 ..	38·8 ..
March	1 ..	59 40	3 40 ..	37·0 ..	41·0 ..
"	3 ..	61 56	0 8 ..	41·0 ..	45·5 ..
"	4 ..	63 57	2 15 West	39·9 ..	39·9 ..
"	5 ..	64 40	2 59 ..	34·2 ..	38·1 ..
"	6 ..	65 15	1 35 ..	38·1 ..	38·8 ..
"	7 ..	66 21	1 26 ..	34·2 ..	41·1 ..
"	8 ..	68 31	4 15 ..	33·1 ..	34·2 ..
"	9 ..	70 30	7 47 ..	32·0 ..	30·9* ..
"	10 ..	.. ..	.. ..	11·7 ..	30·9* ..

* Between ice, in sight of Jan Mayen.

By this it will be seen that the sea on its surface, near the Polar Circle, even in the beginning of March, and notwithstanding the effects of a long and cold winter, still retained a heat of 41° Fahr.: therefore it is not improbable that a branch of the warmer current is connected with the above-mentioned high summer temperatures of the north coast of Iceland, and that it possibly displaces the eddy of the cold Arctic current, and helps to remove the Greenland ice from the coast of Iceland in July and August.

I beg to call attention to this point; further observations will show if my supposition be right or not.

The thermometers used on the voyages to North and East Iceland for determining the temperatures of the surface of the sea, as well as the thermometer used by the *Fox*, were all verified and delivered by me; the observations will be found noted down in the logbooks of the different vessels, and the captains being intelligent men, who all took an interest in their work, I do not doubt the veracity of their observations.

To prove the influence which the warmer currents have on the climate of Reikiavik (though its harbour is sometimes frozen in severe winters), in opposition to the climate of Oford, situated on the north coast of Iceland and exposed to cold currents from the Icy Sea the greatest part of the year, I add the following Tables of Temperature of the Air:—

REIKIAVIK, 64° 9' lat. N. (Obs. Met. in Islandia. Thorsteinson. Hafnia, 1839).

Winter.	Spring.	Summer.	Autumn.	Mean for the Year.
° 29·1 Fahr.	° 37·0 Fahr.	° 53·5 Fahr.	° 37·9 Fahr.	° 39·4 Fahr.

OFIORD, 65° 40' lat. N. (Kaemtz, 1832, vol. ii., p. 88).

Winter.	Spring.	Summer.	Autumn.	Mean for the Year.
° 43·2 Fahr.	° 28·2 Fahr.	° 49·8 Fahr.	° 34·5 Fahr.	° 32·3 Fahr.

Difference in latitude 1° 31'

Difference in the annual mean temperature 7° Fahr.

As a proof of what kind of weather may be met with on the north coast of Iceland, even in summer, I give an extract of Scheel's meteorological observations, which are to be found in his second volume.

Station: A dwellinghouse at the inmost part of the Tharalatur-fjord, between Cape Nord and Geirolfagnup:—

	Morning.	Noon.	Evening.
1809.	°	°	°
August 1, gale from north-east	47·7 Fahr.	34·2 Fahr.	30·9 Fahr.
„ 2 „ „	33·1 „	33·1 „	32·0 „
„ 3, increasing gale	30·9 „	32·0 „	33·6 „
„ 4, moderating gale	33·1 „	32·0 „	33·8 „

Finally, I add the observations made by Dr. Thorsteinson on the surface of the sea at Reikiavik, given me by Professor P. Pedersen, in 1855:—

Reikiavik.	Number of		Mean.	Highest.		Lowest.	
	Years.	Obs.	Fahr.	Fahr.	Years.	Fahr.	Years.
			°	°		°	
January	20	168	34·8	45·5	1833	29·8	1848
February	20	142	34·2	43·3	1841	30·9	1844
March	20	139	36·1	44·4	1851	30·9	1851
April	21	144	37·3	47·8	1833	32·0	1836, 1837
May	21	189	44·6	50·0	{1833, 1834, 1838, 1842}	36·5	1851
June	21	223	49·3	56·8	1833, 1843	41·0	1836
July	22	263	52·9	61·3	1833, 1843	46·6	1836
August	22	262	49·1	61·3	1843	43·5	1836
September	21	253	45·9	55·6	1843, 1852	38·8	1836
October	21	237	40·6	47·7	1838, 1842	28·6	1843
November	21	195	37·2	55·6	1844	28·6	1832
December	20	156	35·8	42·1	1840	30·9	1848

MEAN Temperature of the Surface of the Sea at Reikiavik.

Winter.	Spring.	Summer.	Autumn.	Year.
° 35·0 Fahr.	° 39·4 Fahr.	° 50·5 Fahr.	° 41·2 Fahr.	° 41·5 Fahr.

2. *On a Method for determining Longitude by means of Observations of the Moon's greatest Altitude.* By WILLIAM SPOTTISWOODE, M.A., F.R.S., F.R.G.S., &c.

THE object of the following Tables is the determination of longitude from a simple sextant observation of the moon's greatest altitude. Owing to her motion in declination, the moon's greatest altitude will always exceed her meridian altitude; and when the motion is sufficiently rapid, the former, which can always be made the subject of direct observation, may be used for determining the longitude. The Tables furnish the corrections required to be applied to the observed altitude in order to reduce it to the meridian altitude. The latter quantity and the latitude being known, the declination at meridian passage is also known; and the difference between this and the declination at her nearest Greenwich meridian passage will be the amount of declination gained or lost between the two meridians. The longitude being, as usual, supposed to be known approximately "by account," the rate of motion in declination can be taken out of the 'Nautical Almanac;' and the amount divided by the rate will give the true longitude in time.

The present method does not pretend to the same degree of accuracy as those of Jupiter's satellites, and of lunar distances; but the simplicity of both the observation and the calculation may render it useful for checking the dead-reckoning of a traveller whose last chronometer has broken down, either as supplementary to more elaborate processes, or as a substitute when they are not practicable.

The mathematical theory, upon which the present method is based, has been the subject of a communication to the Royal Astronomical Society, and is published *in extenso* in their Memoirs (vol. xxix., p. 343). It will therefore be sufficient here to subjoin the final formula from which the Tables have been calculated.

FORMULA.

FORMULA.

If D be the meridian declination sought,

L „ latitude,

A „ greatest altitude,

Δ' „ difference of declination for 10 minutes, given in the Nautical Almanac,

$$m = 1.04 \frac{dD}{dt},$$

then

$$D = 90^\circ - (A + L) + \frac{m^2}{2} \frac{\cos A}{\cos L \sin (A + L)},$$

and the rule for using the Tables may be thus stated :—

Meridian declination = difference between 90° and $(A + L)$ + $\frac{\text{Corr. Table I.}}{\text{Corr. Table II.}}$

EXAMPLE.—1860, June 25 d. 5 h. 30 m. Lat. $51^\circ 45' 36''$ N. Long. by account 0. Apparent greatest altitude of D 's upper limb $33^\circ 27' 0''$. Diff. of declination in 10 m., from 'Nautical Almanac,' $156''$.

By ordinary methods (worked *accurately*),

True alt. of D 's centre	..	$\overset{0}{33}$	$\overset{1}{58}$	$\overset{0}{39}$	
L .. .. .	..	51	45	36	
$A + L$ .. .. .	..	85	44	15	
		90			
			4	14	45
$\frac{\text{Corr. Table I.}}{\text{Corr. Table II.}} = \frac{54''}{1.17}$	=				46+
$\text{D}'\text{s meridian decln.}$	=	4	16	31	
do. at 5 h. (Naut. Alm.)		4	5	29	
		662''	=	11	2

Elapsed time since 5 h. : 10 minutes :: $662''$: 156.7

$\frac{6620}{156.7} = 42^{\text{m}}.25 = 42 \text{ m. } 15 \text{ s.}$ Greenwich time of local
meridian passage .. } 5 h. 42 m. 15 s.

Do. transit (Naut. Al.) 5 38 17

Longitude 3 58 W.

TABLE I.

Y

TABLE I.—Part 1.

Alt.	LATITUDE.													
	70°	68°	66°	64°	62°	60°	58°	56°	54°	52°	50°	48°	46°	44°
80°														
78														13"
76														15"
74														17
72												21"	18"	19
70											24"	23	22	21
68										28"	26	25	24	22
66										32"	30	28	27	25
64								36"	34	32	30	28	27	25
62							41"	38	36	34	31	30	28	27
60						46"	43	40	38	35	33	31	30	28
58					52"	48	45	42	39	37	34	33	31	30
56				59"	54	50	47	43	41	38	36	34	33	31
54			67"	61	56	52	48	45	42	40	37	36	34	33
52		76"	69	63	58	53	50	46	44	41	39	37	36	34
50	86"	78	71	65	59	55	51	48	45	43	40	39	37	36
48	88	80	73	66	61	56	53	49	47	44	42	40	39	37
46	90	82	74	68	62	58	54	51	48	46	43	42	40	38
44	92	83	76	69	64	59	56	52	50	47	45	43	41	40
42	93	85	77	71	65	61	57	54	51	49	46	44	43	41
40	95	86	79	72	67	62	59	55	53	50	47	46	44	43
38	96	88	80	74	68	64	60	57	54	51	49	47	46	44
36	98	89	82	75	70	65	62	58	55	53	50	49	47	45
34	99	91	83	77	71	67	63	59	57	54	52	50	48	47
32	101	92	85	78	73	68	64	61	58	56	53	51	50	48
30	102	94	86	80	74	69	66	62	60	57	54	53	51	50
28	104	95	88	81	75	71	67	64	61	58	56	54	53	51
26	105	97	89	82	77	72	69	65	62	60	57	56	54	53
24	107	98	90	84	78	74	70	66	64	61	59	57	56	54
22	108	99	92	85	80	75	71	68	65	63	60	59	57	56
20	109	101	93	87	81	76	73	69	67	64	62	60	59	58
18	111	102	95	88	82	78	74	71	68	66	63	62	61	60
16	112	104	96	89	84	79	76	72	70	67	65	64	63	61
14	114	105	97	91	85	81	77	74	71	69	67	66	64	
12	115	106	99	92	87	82	79	75	73	71	69	67		
10	116	108	100	94	88	84	80	77	75	73	70			
8	118	109	102	95	90	85	82	79	77	74				
6	119	111	103	97	91	87	84	81	78					
4	121	112	105	98	93	89	86	82						
2	122	114	106	100	95	91	87							
0	124	115	107	101	96	92								

TABLE I.—Part 2.

Alt.	LATITUDE.				
	40°	30°	20°	10°	0°
80°	10"	9"	7"	7"	7"
70	19	16	14	14	15
60	26	23	21	22	23
50	33	30	29	30	
40	40	38	37		
30	48	46			
20	56				

TABLE II.—Divisors of Table I.

Arg. Diff. of Declin. for 10m. Δ'' .							
Δ''	d	Δ''	d	Δ''	d	Δ''	d
5 0	11.6	8 0	4.51	11 0	2.39	14 0	1.47
1	11.2	1	4.40	1	2.35	1	1.45
2	10.8	2	4.30	2	2.31	2	1.43
3	10.4	3	4.20	3	2.27	3	1.41
4	10.0	4	4.10	4	2.23	4	1.39
5	9.6	5	4.00	5	2.19	5	1.37
6	9.2	6	3.91	6	2.15	6	1.35
7	8.9	7	3.82	7	2.11	7	1.33
8	8.6	8	3.73	8	2.07	8	1.31
9	8.3	9	3.65	9	2.04	9	1.29
6 0	8.0	9 0	3.57	12 0	2.01	15 0	1.28
1	7.7	1	3.49	1	1.97	1	1.26
2	7.4	2	3.41	2	1.94	2	1.25
3	7.2	3	3.34	3	1.91	3	1.23
4	7.0	4	3.27	4	1.88	4	1.21
5	6.8	5	3.20	5	1.85	5	1.20
6	6.6	6	3.13	6	1.82	6	1.18
7	6.4	7	3.07	7	1.79	7	1.17
8	6.2	8	3.01	8	1.76	8	1.15
9	6.0	9	2.95	9	1.73	9	1.14
7 0	5.9	10 0	2.89	13 0	1.71	16 0	1.13
1	5.7	1	2.83	1	1.68	1	1.11
2	5.6	2	2.77	2	1.65	2	1.10
3	5.4	3	2.72	3	1.62	3	1.08
4	5.3	4	2.67	4	1.60	4	1.07
5	5.1	5	2.62	5	1.58	5	1.06
6	4.9	6	2.57	6	1.55	6	1.04
7	4.8	7	2.52	7	1.53	7	1.03
8	4.7	8	2.47	8	1.51	8	1.02
9	4.6	9	2.43	9	1.49	9	1.01
8 0	4.5	11 0	2.39	14 0	1.47	17 0	1.00

3. *Expedition up the Si-kiang River.* By Lieut. LINDSAY BRINE,
R.N., F.R.G.S.

I HAVE the honour to forward to you the following account of the expedition up the Si-kiang, or Western River (generally called the Broadway), undertaken for the purpose of surveying that river and finding how far it was navigable, and also to accustom the Chinese to our presence, and compel them to receive us and open their gates in those cities hitherto unvisited by Europeans.

Our force consisted of seven gunboats, and the boats of H.M.S. *Cambrian*, *Assistance*, *Adventure*, and *Fury*, under the command of Captain M'Cleverty, R.N., and nine hundred troops, chiefly marines, under General Straubenzee. Mr. Parkes, the consul, accompanied us as interpreter. The French were represented by a small paddle-steamer and a company of seamen under Captain d'Abouville. Lord Elgin had intended accompanying the expedition, but, at the last day, changed his mind, and started for Cochin China, the scene of the French operations. The troops were embarked in large shallow draught-chops, towed by the gunboats, and on Wednesday, Feb. 16th, the expedition left Canton, picking up the boats of the ships at Whampoa en route: I proceeded with our boats to the *Staunch* gunboat. We entered the network of channels connecting the two rivers immediately below the second bar, about 15 miles above Boca Tigris, but did not reach the Western River until the afternoon of Saturday, 19th, on account of the delays occasioned by taking a wrong passage, by gunboats grounding on the spits and knolls, and by the necessity of always anchoring before night. Surveys of the channel were taken under the direction of Lieutenant Bullock, of H.M.S. *Acteon*.* A partial survey had been previously taken of this passage, and also of the Western River, as far as San-shui, by Commodore Elliot in 1857. The actual length of the passage is about 35 miles, with a depth of water averaging at low water 10 to 15 feet (rise and fall 8 feet); the breadth rarely less than 80 yards. The country to the south is flat and uninteresting, being chiefly devoted to the growth of rice and bamboos, the banks as usual being lined with banana-trees. On the opposite bank it is hilly, and there are three or four towns of considerable importance, two of them walled. Near one of these—Shan-tuk—I saw the mulberry in cultivation. We entered the Western River at about 50 miles from its mouth, and proceeded at our best speed, always anchoring at night. By eleven on Sunday morning we were abreast of San-shui, 40 miles west of Canton, the highest point reached by Commodore Elliot. Up to this the river was a clear, broad stream, with sufficient depth of water at all times for vessels of 15 feet draught. On its right bank ran a long range of brown, pine-skirted hills, of heights varying from 400 to 800 feet. The country on the left bank was chiefly flat, with occasional hillocks. The land was in good cultivation, but there was little activity on the river. The principal growth was the sugarcane and bamboo, several sugar-mills being at work on both sides. The whole country, both in grandeur and culture, was far superior to what I had yet seen or heard of in China. The river-banks, composed of sand and gravel, were large and sloping, and in many places cultivated in plots down to the water-level. Numbers of trees lined them, mostly of the banyan tribe. One class of trees, low and broad-crowned, is very common, and bears a most glorious sombre-green foliage. Abreast of the San-shui was a dismantled stone battery, capable of mounting eighteen guns. Above this the river trends in a westerly direction, several considerable villages lining its banks, the country on both sides being hilly; the range on the right bank gradually becoming mountainous, the river narrowing to 400 or 500 yards. Twenty-five miles above

* See Publications of Hydrographic Office. China, No. 5.

San-shui the river cuts its way right through the range, creating a magnificent pass or gorge some three miles in length, the bare and rocky faces of the hills on either side running perpendicularly down to the water. The breadth of the pass must be three-quarters of a mile, but appears much less. We found no bottom with the hand-lead at 18 fathoms. The opening of the pass is very similar to that of Balaclava harbour, but on a grander scale. Small Buddhist temples are erected at both openings, and a small three-storied pagoda commands the pass at its upper end. The hills were of the usual character in this (the Kwang-tung) province, viz., sandstone lying on granite. Issuing from the pass, on our way upwards, the river considerably broadened, opening into a fertile and well-cultivated hilly country, the surrounding hills crowned with seven and nine-storied pagodas. At 6:30 P.M., on Sunday, we anchored off the walled city Shan-king, or, as it is called in the provincial dialect, Shoo-king, the ancient capital of the Kwang-tung province. The point we had now reached was 30 miles above San-shui, and 80 from where we had entered, in all 130 from the mouth, supposing the part near Macao to be so called, the river still preserving its depth and altering but slightly in breadth, the water beautifully clear and pure. On Monday forenoon the mandarins came off to call upon our authorities and welcome us to the town. They complained very much of the misery brought on the people and the surrounding country by the attacks and depredations of the rebels, who were scattered around in all directions. The mandarins were received with their proper salute, three guns. In the afternoon the whole force landed, and marched through the city and a few miles into the country, returning in the evening. On Tuesday morning the General, Captain McCleverty, and three light-draught gunboats, proceeded higher up the river, leaving the troops, &c., behind at Shan-king. Here we remained until their return on Saturday afternoon. The troops and naval brigade daily marched out into the country 4 or 5 miles, in different directions, taking their provisions with them, coming back to their vessels before night. Shan-king presents the appearance of once having been a city of considerable importance and power, now sinking into decay. Several of the old mandarin residences or yamuns, once noble buildings, are now falling to ruins, and the resort of beggars. The pagodas are all very ancient, and crumbling away. There are few signs of trade. The only signs of anything being done beyond what is necessary for their own use, are in the manufactures of fans and marble ornaments. There are the usual vegetables, ducks, pigs, &c. Bullocks from a little distance out, supply our market in the Canton River. The city walls are rather more than 2 miles in circuit, built of the usual blue clay brick, based upon granite; their height is about 20 feet. Here and there are a few embrasures, but only one gun is mounted, and that one of our old 32's. The garrison consists of two thousand men, who take their guards at the different gates for the purpose of repelling any chance incursions from the rebels. They are miserably armed, with gingalls and bows and arrows of the worst description. The roads are better kept and broader than in most parts of China, although even here they frequently are barely wide enough for one person. At the back of Shan-king there is a very remarkable group of limestone rocks, thrown up perpendicularly from the level to a height of 300 to 400 feet. Buddhist priests have built or hewn themselves cells all over the faces of the rocks, reaching them by steps cut out from the solid marble. Their temples are at the base, one of them containing some very valuable and curious bronze josses. In the largest of these rocks is a very extraordinary cave, running right through the mass, in one place forming for itself a species of dome nearly 100 feet in height, with beautiful pending stalactites. The priests were proud of their cave, and delighted in showing us all its peculiarities, echoes, &c. I happened to have a hammer at hand, with which I detached some pieces of the rock. The marble varies from a pure white, somewhat similar to the Pentelican, to a grey-blue, sometimes veined with red. That there is a great deal of marble about is evident, from the

fact that all the sides and bases of the temples, and the principal portions of the yamuns, are composed of it; the sacred vessels in the temples also, that elsewhere are usually iron or bronze, are here all marble. The hills and surrounding country are composed of granite, quartz, and sandstone, the soil bearing that peculiar reddish hue, caused by iron and decomposed granite, so common to the islands of the African coast and in the Eastern Archipelago. Rice and sugar-cane were in cultivation, and the papaw, lychee, and peach-trees in blossom. The river at Shan-king is almost free from the influence of tides, they having at times just sufficient power to counteract the down current, and cause slack water. From the appearance of the banks I should say that the river during the rains must rise over 6 feet. The river's bed is of sand and gravel, and somewhat rocky. On Saturday, 26th, the surveying expedition came back. Lieutenant Bullock informed me that they were enabled, with some trouble, to reach the first class walled city Wu-chou, situated on the left bank, 76 miles above Shan-king. At this point they had only 5 feet water.

Extract from Hydrographic Notice; China, No. 5.

"*Shao-king to Wu-chau-fu.*—On the 22nd February the *Watchful*, *Janus*, and *Woodcock* started for Wu-chau. There the river winds through a continuously hilly country of sandstone and granite, chiefly in northerly and westerly directions. The hills, varying from 100 to 1500 feet in height, are in general densely wooded, and many highly cultivated. Near Shao-king limestone hills appear in rugged and picturesque groups; one crops out on the river of a most picturesque form, and is called by the Chinese Kai-yik-kwan, or the Cock's Comb, which it strongly resembles. A group also lies 2 miles north of Shao-king, to which they give the name of the Seven Stars, after the beautiful constellation of the Great Bear.

"At 50 miles above Shao-king, and on the left or north shore of the river, a single mass of granite (in the form of a thumb) rises perpendicularly some 300 feet out of a range of hills of 1500 to 1800 feet elevation. Its local name is Kum-kwoh-shek, but it is also called Fa-piu, or the flowery tablet, and it is the most remarkable object in the river. After passing this, the navigation becomes dangerous, and the river-bed studded with rocks.

"The district city Wu-chau or Ng-chau is 75 miles above Shao-king. Its latitude by observation is $23^{\circ} 28'$ N. (22 miles north of Canton), and its longitude, approximately, $112^{\circ} 14'$ E. The breadth of the river here is about three cables between the sandbanks, and nearly a mile from shore to shore, but it is with difficulty navigable by junks higher up at this season; the first rapids being (by report) about 12 miles above Wu-chau.

"Wu-chau-fu stands at the confluence of the stream on which is Kwei-ling, the capital of Kwang-si. This communication was open, though the intermediate country was in the hands of the rebels. It had the appearance, observed from the heights, of being easily navigable by gunboats."

Wu-chou is one of the most considerable cities in the Kwang-si province, and in peaceable times carries on a great trade. On the right bank, 30 miles above us, was the walled city Tih-king. The bed of the river all the way became more and more rocky and difficult to navigate, knolls here and there jutting out with few feet water on them. But they found that there was a good, safe passage for vessels of the class of H.M.S. *Furious*, not drawing over 15 feet, as high as Tih-king. Above this the river became only fit for handy, light-draught steamers. One hundred and eighty miles up there are rapids. Its trend as far as Wu-chou was nearly due west, slightly northing. From Shan-king up the hills became better wooded, and near Wu-chou were well clothed with trees. Timber was a principal article of trade. More limestone rocks were seen; those in the river were a sort of sandstone. At Wu-chou they were in daily expectation of an attack from the rebels, and had a force of over 6000 men within the walls.

On Sunday, the 27th, we weighed and proceeded back, calling at San-shui, Shan-tuk, and Sha-wan on our way, reaching Whampoa on the 3rd March. San-shui is situated on a broad creek running out from the Western River, and connecting that city with Fatshan and Canton: the passage is shallow, and barely navigable for gunboats. Shan-tuk, or Ty-loong, is situated about half-way between the Western and Canton rivers, on the passage by which we entered. It stands about 4 miles back from the water, at the rear of some low hills.

We expected to find some difficulty in entering the city, for it had always held warlike pretensions, and was well walled and garrisoned. However, we marched in on Tuesday forenoon, and were well received. We halted in the principal yamun, where the mandarins had prepared a good tiffin à la Chinoise for the officers, as well as tea and large quantities of oranges for the troops. This city, within the walls, was over 2 miles in circumference, and densely populated. The suburbs were of still greater extent. A creek, with sufficient water for pinnaces, ran through the heart of these suburbs, and was spanned with two well-built granite bridges of three and five arches. There were many good shops, and several handsome yamuns. Shan-tuk presented a good contrast to those cities we had previously visited, from its greater cleanliness and activity. Here, too, I saw double walls running through the town, for the purpose of arresting the progress of fire. The city walls averaged 25 feet in height, with no embrasures: their thickness at the base, including facing and earth-work, was not less than 20 feet. After the interview with the mandarins, our proclamations announcing our peaceable intentions, &c. &c. were posted about the town, and we returned to the ships, our salute to the mandarins at Shan-king being returned here. The city Sha-wan is thickly populated, as all other Chinese towns, but is not of much importance. It was near Shan-tuk that I saw the mulberry in cultivation, but I did not see any silk manufactories in the town.

The result of this expedition must be highly gratifying to all who are anxious for the extension of trade and of geographical knowledge. It has shown the entire navigable length of a very noble river, and accustomed the Western Chinese to our friendly presence, also to our power. Now that China is daily becoming more open to our enterprise, there is every reason to believe that this river will be of great importance to us, opening, as it does, such a communication with the Western provinces. At present the only trade appears to be timber, sugar, and bamboo, the latter supplying the paper manufactories near Canton; but this want of activity can well be accounted for by the harassing presence of the rebels, who, by seizing the crops and detaining the junks, throw a blight over the whole face of the country. This conflict between the Celestials and Imperialists promises to be of so long a duration, and probably eventually to the detriment of the present dynasty, that it is impossible to hope, for very many years, for any alleviation to this distress. From the appearance of the men in the cities and villages we visited, I should argue a more general freedom from disease than is met with elsewhere. Diseases of the skin are not so common, and the standard of stature is higher. This, I suppose, is partly due to the purity of the water, and to the fact of there being less ground used for rice-fields. From Tih-king to the river's mouth, a distance of nearly 160 miles, the deep-water passage is almost entirely on the left bank. That part of the river below Shan-king is called by the Chinese Shan-kiang, or mountain river.

P.S.—A hurried survey of the river's mouth was taken by the expedition in 1857, and they reported that on the bar near Macao there was not more than 13 feet at high water. If this be correct, the best entrance will be from the Canton River by the passage we took.

4. *Geological Notes of a Journey in South Australia from Cape Jervis to Mount Serle.* By ALFRED R. C. SELWYN, Government Geologist, Victoria.

HAVING been invited by the South Australian Government to visit that colony for the purpose of examining into and reporting on the geological evidence of the probable extent and character of its gold-bearing rocks, as also on any indications of the existence of workable coal-fields, and the applicability of the Artesian principle for securing a permanent supply of water in the northern districts, and generally on its geological structure, it was with much pleasure that I embraced the opportunity thus afforded of instituting a comparison by personal examination between the rock formations of Victoria and those of supposed similar age in the sister colony.

On the receipt of the invitation, therefore, I immediately applied for leave of absence from my official duties in Victoria for a period of two months. This was at once granted by the Chief Secretary, to whom a communication on the subject had also been made by the South Australian Government.

I arrived at Adelaide on Sunday, the 1st of May, 1859. On Monday, the 2nd of May, I communicated with the Hon. F. Dutton, the Commissioner of Crown Lands, for the purpose of making such arrangements as would enable me to commence my examination without delay, and extend it over as large an area as possible in the limited time at my disposal.

From the rapid way in which I passed over the country, and the consequent very cursory examination I was able to make of any one locality, it will be impossible for me, in this Report, to enter into any minute geological and lithological details. I propose, therefore, in the first place, simply to give extracts from my rough notes as they were written from day to day, in order to indicate the general line of route followed, and at the same time to show, to some extent, the opinion formed of each locality at the time it was examined. I shall then briefly state, in conclusion, the opinion I have now arrived at regarding the main points to which my attention was directed.

Since my return to Melbourne, I have read Mr. Babbage's Reports, made in 1856, to the Chairman of the Gold Search Committee, and regret exceedingly that I had not an opportunity of seeing them before commencing my examination, as I now find that much of the country I traversed had previously been examined by Mr. Babbage; and that, amongst much interesting geological information, he mentions the occurrence of rocks that quite escaped my observation.

(Here follow, in the original Report, several pages of extracts from Mr. Selwyn's notes; the conclusions at which he arrived are thus stated:)

It is much to be regretted, and I was greatly disappointed, that I did not find the smallest trace of organic remains in any of the older rocks of the South Australian chain, though carefully looked for from Cape Jervis to Mount Serle; unless indeed the peculiar circular and oval-shaped markings in the quartzose sandstones west of Port Augusta are annelide tracks. In order to ascertain this, it would be advisable that a number of them should be collected for examination. In the absence of such fossil evidence, and without a much more minute and extended survey than I was able to make in the limited time at my disposal, and in the rapid manner in which I traversed the country, it is almost premature to express any opinion, either as to the probable age, or even super-position, of the various rock masses forming the central mountain chain of South Australia. I am, however, inclined to think that they may eventually be grouped under three distinct and unconformable formations. Whether all of them are members of the Cambrian and Silurian series, or whether they extend up to the Devonian and Old Red, it is quite impossible to

decide until fossiliferous beds are found ; by which a fixed starting-point can be determined.

Taking them in their descending order, they are :—

1st. Those beds which occupy, in great anticlinal and synclinal undulations, the whole of the country north to Mount Serle, from a line drawn from the head of the Willochra north-easterly to the head of the Siccus River, consisting chiefly of the upper quartzose sandstone and quartz-rock series ; which, commencing with the summit of Mount Remarkable, extends through all the peculiar flat-topped and tent-shaped hills west of Port Augusta, and forms generally the summits of all the higher peaks and ranges as far north as Mount Serle, including the singular and picturesque Pound Ranges at Wilpena and Warraweena.

2nd. The beds that occupy the whole of the country south from the above-mentioned line to Cape Jervis, consisting chiefly of slates, shales, and sandstones of various textures and colours, with intercalated bands of gneissose, eurtic, and micaceous schists, bands of quartz-rock, and crystalline limestone, associated in certain localities, from the Gawler River south to Cape Jervis and Port Elliot, with eruptive granitic and hornblendic rocks.

3rd. A series of beds, certainly the lowest in geological position in the whole of the central chain, but occupying a comparatively small area, chiefly confined to the watershed of the Onkaparinga. On these the only profitable gold-field hitherto discovered in South Australia is situated, and it is, I think, along the axis of these lower beds only, that any important extension of the already known auriferous area can be expected.

It is just possible that no such natural divisions exist in the rocks of the South Australian chain as are here sketched out, and that the difference in general mineral and lithological characters observed, between the northern and southern rocks, is entirely due to the metamorphic influence of the granitic axis that, at Cape Jervis, extends in a north-easterly direction, showing itself at intervals on the surface to Angaston, and then seems to break through the chain and continue its course to the north-east, passing under the great tertiary flats of the Murray basin ; and, in all probability, again re-appearing in the Barrier or Stanley Ranges.

The only locality in which the rocks of the South Australian central chain bear any decided resemblance in mineral and physical structure to the auriferous Silurian rocks of Victoria is in the valley of the Onkaparinga.

I do not think that there are any rocks whatever in those portions of the colony that I examined, that would indicate the presence of a carboniferous formation either of palæozoic or oolitic age. The supposed coal found near Adelaide is a tertiary lignite, which I have no doubt abounds in many parts of the extensive unexplored tertiary basins of South Australia, as it does in rocks of the same age in Victoria.

Though thus apparently deficient in rich deposits of the precious metal, so lavishly distributed in Victoria, South Australia possesses many other great natural resources on which she may safely rely for future prosperity. Her iron ores are rich and abundant ; as also her copper and lead mines, which, I have no doubt, will go on steadily increasing in number and importance ; as also her vineyards and corn-fields, that are capable of producing grain of the finest quality, and wines that may be expected to vie with the best that are grown in Europe. At Pewsey Vale, Mr. Gilbert already grows wine that is little, if at all, inferior to the highest class of continental wine of a similar description ; and I have no doubt that, with greater experience in the manufacture, and labour less costly, a corresponding improvement in quality, as well as reduction in cost, will be effected.

In the north, the fine, open, available agricultural lands are very extensive ; and though, on account of the dryness of the soil and the great heat, they may not be well adapted for the growth of wheat, they would, I have no

doubt, produce fine crops of maize, sorgham, millet, gram, and other products, that are successfully cultivated in somewhat similar soils and climates in other countries. It is a mistake to suppose that the soil generally on the northern plains is poor and sandy: with sufficient moisture it would, I believe, be exceedingly fertile; it consists almost everywhere of a very fine red calcareous loam, so dry as easily to be mistaken for sand, unless closely examined. With the exception, however, of this deficiency in moisture, there is little difference between it and some of the richest soils of the Adelaide and Gawler plains.

With respect to the water supply, I think that any efforts made to obtain this should be directed, with certain local exceptions, towards constructing reservoirs for retaining surface water, for which the physical outline of many parts of the country is eminently adapted, rather than to boring for Artesian springs, for which the requisite geological conditions do not generally exist, and which are farther rendered inadvisable on account of the so commonly saline character of the underground waters in all those tertiary areas within which the required conditions might possibly be found.

I regret that I have not been able to give a more favourable account of the prospects of South Australia either as a gold or coal producing country. Respecting the former, I would, however, distinctly point out, that in the southern districts (or the country lying south of the coloured line drawn on the accompanying map, from near Mount Remarkable, north-east to the head of the Siccus River), beyond a generally unfavourable impression, I have no very good reason to adduce, why some of the numerous quartz veins, that are there found associated with the slaty and arenaceous rocks, should not be auriferous, especially supposing those rocks to be of Silurian age. This is a very important point, and one on which, as yet, unfortunately, we have no reliable information: as it is, however, very desirable that it should, if possible, be determined, and as this can only be effected by the discovery of organic remains, I would suggest that, in future, all the Government Assistant Surveyors should be directed to search carefully for such fossil evidence in the rocks of every district in which they are employed.

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